DOCUMENT RESUME

ED 255 229 IR 051 076

AUTHOR Beckman, Margaret; And Others
TITLE On-Line Circulation: University of Guelph Library. Report No. 8.
INSTITUTION Guelph Univ. (Ontario). Library.
PUB DATE 78
NOTE 64p.; "A technical report describing design requirements and philosophy, file and record structure, system functions and features, hardware/software capabilities and implementation procedures." Illustrations of video terminal displays which make up more than half the document may be marginally reproducible.
PUB TYPE Viewpoints (120) -- Reports - Evaluative/Feasibility (142)

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS Academic Libraries; Foreign Countries; Higher Education; *Library Automation; *Library Circulation; Library Equipment; Library Expenditures; Library Materials; *Library Planning; Library Technical Processes; *Online Systems; Position Papers; Program Evaluation; *Systems Development; Technological Advancement
IDENTIFIERS *University of Guelph (Ontario)

ABSTRACT

This report describes the development, design, and evaluation of an online circulation system at the University of Guelph, Ontario. A 1976 study identified the specific problems or inadequacies of the existing circulation system and specified design requirements for a new online system. This 1978 report is divided into six parts: (1) historical background; (2) inadequacies of the off-line batch-mode system including mechanical breakdown, errors, inefficient and costly use of staff, reserve desk, and study conclusions; (3) design requirements for an online circulation system including functional and philosophical requirements; (4) evaluation of alternatives and choice of a system; (5) system design including a description of the design team and philosophy, equipment, and software; (6) functions of patrons and staff in using the GEAC Library Circulation; and (7) implementaton from first semester operation, September 1977-December 1977, to final implementation, January 1978. Numerous figures display actual online system computer screens. An equipment list is appended. (THC)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION
CENTER (ERIC)

☑ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

John Black

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

On-line circulation: University of Guelph Library

A technical report describing design requirements and philosophy, file and record structure, system functions and features, hardware/software capabilities, and implementation procedures.

by

Margaret Beckman,
Robert Logan,
Larry Porter

University of Guelph Library
Guelph, Ontario

Copyright © 1978 University of Guelph. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage or retrieval system without permission in writing from the University of Guelph.

University of Guelph Library
Report No. 8

TABLE OF CONTENTS

Preface and acknowledgements.

I. Historical background.

II. Inadequacies of the Off-line Batch-Mode System.
1. Mechanical breakdown.
2. Errors.
3. Inefficient and costly use of staff.
4. Reserve desk.
5. Study conclusions.

III. Design requirements for an On-line Circulation System.
A. Functional requirements.
B. Philosophical requirements.

IV. Evaluation of Alternatives and Choice of a System.

V. System Design.
1. Design team.
2. Design philosophy.
3. Equipment.
4. Software.

VI. Functions of the GEAC Library Circulation System.
A. Patron functions.
1. Book/Item Inquiry.
2. Borrower Inquiry.
B. Staff functions.
1. Charge/renewal.
2. Discharge/reshelve.
3. and 4. Public or patron functions.
5. Borrower validation.
6. Borrower maintenance.
7. Item maintenance.
8. Hold maintenance.
9. Reserve maintenance.
10. Supervisor maintenance.
11. Calculate check digit.
12. System notes.
13. Bar-code tester.
14. Biblio search.

VII. Implementation.
1. Bar code labeling project.
2. Policy implication and definition.
3. Information messages.
4. Communication with user community.
5. Patron badges.
6. Parallel operation, July-August, 1977.
7. First semester operation, September, 1977-December, 1977.
8. Final implementation, January, 1978.

PREFACE AND ACKNOWLEDGEMENTS

The system design team for the GEAC Library Circulation System was as follows:

GEAC Canada Ltd: Michael Monahan
Erich Buss

University of Guelph Library: Ernst Wuthrich
Kit Bell (January-April, 1977)
George Loney (April 1977-)

Supervision was provided by:

GEAC Canada Ltd: Angus German

University of Guelph Library: David Paterson
Larry Porter

Members of the Library Division of Information and Circulation Services with particular involvement included:

Pat Hock
Bernard Katz
Ellen Pearson

in addition to Virginia Gillham, from the Library Documentation and Media Resource Centre.

The contribution of several others should also be specifically mentioned: Robert Atkinson, Robert Logan, Ellen Tom, and John Black.

The introduction of any new system into a library is always a complicated operation and depends on the goodwill and cooperation of not only the entire library staff, who must continue the functioning of the old system with increasing difficulty, but also the University administration, the faculty, and the students. The University of Guelph Library was particularly fortunate in receiving such cooperation from all quarters, with the support of the Institute of Computer Science particularly welcomed.

One final acknowledgement should be included. The University of Waterloo Library was implementing a GEAC Library Circulation System at approximately the same time as the one at Guelph. The close liaison provided by the Waterloo Systems Librarian, Gene Damon, was encouraged by University Librarian Murray Shepherd and Assistant Librarian Bruce McNeil, and is acknolwedged with gratitude.

I. HISTORICAL BACKGROUND

The University of Guelph received its charter in 1964, one of seven new universities which the government of Ontario created in the early 1960's. Guelph was slightly different in that it was based on the integration of three existing colleges: Ontario Veterinary College, founded in 1862; Ontario Agricultural College, founded in 1874; and the Macdonald Institute, (a college of home economics) founded in 1902. Each of these colleges had existing libraries and department libraries, with collections totalling more than 200,000 volumes.

These initial collections were immediately augmented by receipt of some 65,000 volumes from the ONULP* project, a device whereby the provincial government contracted with the University of Toronto Library to select and process basic library collections in the humanities and social sciences for the new universities. In addition, the Guelph acquisition budget, more than $700,000 per annum from 1965-1968, added thousands of new monographs, documents, and serials which had to be integrated into the original and ONULP collections. Automated cataloguing systems were seen as the only solution to the organization, access, and processing problems which resulted, and by 1967 separate systems for the cataloguing and processing of government publications, monographs and serials were designed and implemented by the Guelph staff.

*ONULP: Ontario New Universities Library Project.

The early automated systems were batch mode, operating on the university computer, an IBM 360/30. Their success led to one of the design criteria for the McLaughlin Library, the 270,000 square feet central library building which opened in August 1968: the new library must accommodate automated systems. Accordingly, the McLaughlin Library was specifically designed for automated circulation control, and an automated circulation system became an important subset of the Guelph cataloguing system, extracting necessary data elements from the Guelph master file of bibliographic records.

This basic circulation system, using punched book cards and patron badges, served Guelph reasonably well from 1968 until 1976, with circulation transaction lists printed daily, and with overdue and fine notices, error and edit check lists, as well as management reports produced as required. A simple system to handle reserve book circulation was added in 1973. The data collection terminals were changed in 1972 from IBM 1030's to Colorado Instruments (later Mohawk) C-Dek's, but the original concept of the system was not altered.

By 1976 the University of Guelph enrolment had increased from 3,000 to 10,000 and the pressures on the Library were considerably greater than they had been in 1968. For instance, some 500,000 books and documents were circulated in 1976/77, and in library use, which included the non-circulating journals, was double that amount. Conditions created by these numbers, knowledge of changing technology, and the need to hold constant or to reduce library positions led to consideration of an on-line system for circulation early in 1976. This consideration took the form of a study which identified the specific problems or inadequacies of the existing circulation system, and specified design requirements for a new one.

II. INADEQUACIES OF THE OFF-LINE BATCH-MODE SYSTEM

The Library staff study team identified the following inadequacies:

1. Mechanical breakdown.

As a result of the transaction load mentioned above, the percentage of errors present in the circulation system increased greatly during 1975 and 1976 due to problems with the C-Dek terminals. Mohawk Data Corporation had stopped production on these terminals in 1975, and mechanical breakdowns increased to the point where an average of three service calls were required each week instead of one call every three weeks as had been necessary in 1974. Each time a terminal broke down increased the opportunity for incorrect data being recorded. The manufacturer claimed that the terminals were not designed to take the excessive transaction load which they were experiencing.

2. Errors.

The method of data collection using punched cards and badges had double punch and blank column detection to prevent incorrect data from being accepted. This unsophisticated method of automatic checking allowed errors to creep into the system undetected. In addition, students in increasing numbers found ways to subvert the system, the most common being the switching of book cards between books.

Despite all efforts by the Guelph Library staff errors continued in the final outputs of the circulation system: overdue and fine notices sent to patrons. These incorrect notices created a great deal of unnecessary friction between the Library staff and the user community, and to an unfortunate extent undermined the public relations efforts of the Library.

Current technology for data collection uses bar coded labels, with an error potential of one in two hundred thousand reads. This rate can be further reduced by a one in ten chance of the error matching a correct record; thus the total theoretical error possibility is one in two million. It was felt that adoption of such a system at Guelph would not only eliminate errors but would also stop the subverting of the data by patrons, since the labels are manufactured in such a way that any attempt to remove them results in their destruction.

3. Inefficient and costly use of staff.

The Library circulation staff developed a series of checks and counter checks to compensate for the errors which were present in the off-line system. These checks were very time consuming and expensive and put an unnecessary load on an already overburdened staff. The cost of this checking was estimated at $13,500 annually.

Another area in which inefficiencies were evident was in the Library holds procedure. This is one of the most critical procedures performed in the Library, requiring the manual checking of the approximately one million books reshelved each year. This checking is done in the most part by student pages, and the fact that they were part-time and that there were so many persons involved magnified the chances for error. The use of the holds procedure increased by an average of 50 per cent per year from 1972, averaging 4,000 requests in the fall and winter semesters of 1975/76.

It was concluded that an on-line system would eliminate the necessity for this manual checking routine at a savings of over $9,000 in staff time annually. In addition, another area of user dissatisfaction would be removed, since the capture of items requested by patrons would be facilitated at the circulation point, before books reached the shelves or were charged out from the Library.

4. Reserve Desk.

Use of the reserve book system had increased almost 30 per cent per annum from the time the Library opened in 1968, stretching the capacity of the simple semi-automated system to its limits. It was realized that a more sophisticated system was necessary, not only to maintain efficient service to the students without adding to staff numbers, but also to provide the management information necessary to ensure that the reserve service was being responsive to the needs of the teaching program.

5. Study conclusions.

The study conducted by the Library staff concluded that benefits from conversion to an on-line system with bar coded labels would occur primarily in three areas.

(a) Data accuracy.

Any data entered into the system would be checked for correctness at the time of capture, not twelve to twenty-four hours later. This would greatly reduce any possibility for error.

(b) Human error.

An on-line system would not be as susceptible to human error, since data checking, overdue and fine notice checking, and the holds procedure would all form part of the automated control system.

(c) Effective use of staff.

The fact that an on-line system would be less labour intensive was also an important consideration. Although the $22,500 annual predicted savings in staff time could not be transferred to other areas of the Library to reduce work load problems, it was estimated that existing or expanded circulation and reserve activities and services could be maintained without requiring compensating additions to the Library staff which would otherwise be necessary.

III. DESIGN REQUIREMENTS FOR AN ON-LINE CIRCULATION SYSTEM

Design requirements for an on-line circulation system identified by the study team fell into two categories. The first encompassed traditional library circulation functions; the second reflected University of Guelph Library philosophy.

A. Functional requirements.

The system must:

1. Accurately record book and borrower information for each transaction.

2. Check each borrower record to determine if the borrower is in good standing.

3. Check each item to ensure that it is not required to satisfy a hold request during both check-in and check-out procedures.

4. Allow easy renewal of material if no hold exists.

5. Allow circulation of reserve items and government documents.

6. Produce overdue and fine notices as well as any other reports necessary for successful operation of the system.

7. Allow rapid easy access to the status of library material while protecting the privacy of the user community.

8. Accurately maintain all necessary files and provide simple accurate updating of those files.

9. Provide adequate security of the system data through the use of passwords and procedure restrictions.

10. Provide timely signals to the Library to allow it to react more effectively to potential problems.

11. Provide accurate timely management information on the circulation system and use of all library materials.

B. Philosophical requirements.

The system must:

1. Operate on an in-house mini-computer, with adequate back-up procedures to ensure continuous operation.

2. Provide capability for direct use by the students and faculty, minimizing the involvement of library staff in routine enquiry procedures.

3. Provide capability for on-line catalogue enquiry as part of the circulation system.

4. Be able to interface with other components of the library system, providing an integrated and responsive total library operation.

5. Provide capability for linking with on-line circulation systems operating in other Ontario university libraries.

These five requirements were most influential in

making the final selection of an appropriate system since no existing on-line circulation system seemed to encompass either the philosophy or power which the Guelph requirements demanded. Essential would be a mini-computer capable of storing and processing all Guelph files of machine-readable records irrespective of record format or file size.

In 1978 the Guelph Library files included:

—monographs, including audio-visual materials (films, tapes, etc.), catalogued in a MARC compatible format: *400,000* records.

—government publications coded using the Guelph Documentation System, which assigns each document a unique, jurisdiction based document number: *170,000* records.

—maps coded in a locally designed system with a geographic map number: *50,000* records.

—serials, which do not circulate, are wanted for display in any catalogue enquiry system. Guelph serials are classified in Library of Congress and individual issue holdings would need to be displayed for enquiry and management information purposes: *10,000* records.

IV. EVALUATION OF ALTERNATIVES AND CHOICE OF A SYSTEM

A specification document was prepared by the study team, and then Canadian and American companies were contacted as possible suppliers. Five companies submitted proposals based on the requirements outlined above. Great difficulty was experienced in evaluating the relative merits of the proposals due to the wide range of features and approaches used. The proposals received divided into three categories:

1. Turnkey systems. The supplier would provide all hardware, software and equipment necessary for installation of the system.

2. Hardware supplied by the bidder, with joint development of software by the supplier and the University of Guelph Library staff.

3. Hardware only, with all software development to be accomplished by Guelph staff.

Table I provides comparison of the most important factors considered in the evaluation procedure, including computer and disc capacity, the terminals, and label production. Costs have been excluded except for the labels because of the variation in system and products offered and because of changed prices.

In addition to the factors displayed in Table I, the following were also considered:

(a) Back-up facilities;

(b) Maintenance and service requirements and capabilities;

(c) Fail-soft capabilities;

(d) Future expansion;

(e) Adaptability;

(f) Possible integration with other library functions;

(g) Future development;

(h) Financial stability of the supplier;

(i) Implementation schedule;

(j) Conversion problems.

One other relevant consideration should be stated. The cost of Guelph Library staff time for development and installation purposes could not be overlooked. It was estimated that this would be up to $50,000 for the joint development proposal, $100,000 for complete software development, and $15,000 for the turnkey proposals.

After much deliberation it was agreed to accept proposal D, (from Table I), involving joint software design. This proposal was from a Canadian computer company, GEAC Canada Ltd., (GEAC), which had had previous success in developing mini-computer based banking systems. The mini-computer hardware which they offered, the GEAC 8000, is a powerful machine with 256K in its CPU processor. Connected to this are two 300 megabyte disc drives, one bar code label printer, one back-up mini, (the GEAC 800 with 64K and a 55 megabyte disc drive), one printer, and 26 terminals with light pens. In addition to the power and capability provided by the hardware, Guelph accepted the GEAC proposal for the following reasons:

1. Price.

The price was the most attractive offered.

2. Flexibility.

The joint design proposal provided the most flexibility in satisfying the stated requirements.

3. Conversion

The accepted proposal would allow gradual conversion to the bar code system through use of an interim terminal which would read existing punched cards and labels as well as bar coded labels.

4. Timing.

The accepted proposal, with the exception of one of the turnkey proposals, offered the earliest relief to the problems identified earlier.

5. Maintainability.

A system designed with the involvement of Guelph Library staff would allow modifications and changes by that staff with relatively little difficulty.

6. Long term implications.

The reserve power provided by the GEAC computer

Table I: Evaluation factors.

Vendor	Software design	Computer capacity	Disc capacity	Terminals	Labels
A	Turnkey System	24K	4 drives 33 MB each 133 MB total	4-CRT & light pen terminals 5-light pen terminals (16 possible)	3.4¢ each, purchased from supplier
B	Turnkey System	184K	3-80 MB drives or 2-300 MB drives 240 MB or 600 MB total	2-light pen charging terminals 2-light pen discharge terminals 3-combination light pen terminals (64 possible)	.06¢ each, produced on printer included in system cost
C	Turnkey System	256K bytes	1-176 MB drives 176 MB total up to 7 additional drives possible	7-CRT & light pen terminals 2-CRT terminals (16 possible)	3.4¢ each purchased from supplier
D	Joint development of software	256K bytes up to 2MB total available	1-300 MB drive attached to 64K intelligent controller up to 7 additional drives possible	7-card badge & light pen terminals 3-CRT terminals (256 possible)	.06¢ each produced on printer included in system cost
E	Software to be developed by Guelph staff	256K bytes	1-93 MB drive 1-2.3 MB drive 95.3 MB total up to 3 additional possible	5-light pen terminals 3-CRT terminals (64 possible)	3.4¢ each purchased from Monarch Marking

would allow the orderly development of a total on-line system for all library functions. It had become apparent that the library staff establishment (175 full-time equivalent positions in 1976/77) could not continue to absorb increasing library use and demands for additional and more sophisticated services. Further reduction of labour intensive activities in the technical services were considered essential, and in-house on-line systems were seen as the only viable solution. It was projected that up to 15 positions could be re-assigned within the next five years if conversion from off-line to on-line systems could be accomplished.

7. Library credibility and cost benefit.

The accepted proposal encompassed the most comprehensive circulation system, allowing the Library to eliminate all elements leading to error and patron dissatisfaction. It would also effect, most immediately, the saving in staff time discussed above.

V. SYSTEM DESIGN

With the hardware chosen the Library next moved into the design phase. Since the accepted GEAC offer had included a joint software development proposal, a study team including both GEAC and Guelph Library staff was established.

1. Design team.

The design team consisted of two systems analysts from GEAC and two from the Guelph Library staff, with project management by one senior staff member from both Guelph and GEAC. In addition, two librarians from the Circulation and Information Services Division were seconded almost full time to work with the team.

The team commenced work on the software design in January, 1977, and had their task completed with software ready for testing five months later.

2. Design philosophy.

(a) File design.

Although an efficient on-line circulation system was the primary objective of the design phase, the need for coordination with the cataloguing, acquisition, serials and document systems was an essential aspect of the Guelph design philosophy. For this reason the design phase began with a study of file structures in known bibliographic processing systems elswhere in North America or Europe. Without hindering the circulation function it was hoped to be able to provide integrated access to all the Guelph records in their varying formats, without the necessity of actual conversion to a common record structure.

This objective was met by adopting a method for structuring the files for internal processing similar to that resulting from the philosophy of the DOBIS* system, implemented at Dortmund, West Germany, in 1976. This concept disperses the various data elements of each record to different files and links them together with keys, pointers and/or indexes. Thus the personal names from the monograph file (which has a MARC-like structure), are held in the same location as personal names from the Guelph document file with its simple documentation structure. When displayed on the terminal, names from both files are shown together as names. If a user or staff member wants to see a complete record, a simple instruction pulls the record together. The call number or document number related to a name, (or title, or other data element), reveals to the user whether he is looking at a record for a monograph, document, or whatever. It should be apparent that an authority system is inherent in the system, without the additional expensive necessity of creating and maintaining a separate one.

(b) Public enquiry.

The second key criteria in the system design was that of public enquiry or use of the system. University of Guelph Library experience with the retrieval systems such as CAN/OLE, Lockheed and S.D.C. had indicated that staff acting as intermediaries were a necessary part of the service. It was agreed that a circulation system which also depended on library staff to interpret or assist in access to the Guelph data bases for monograph, serial, documents and maps, or to files of circulation and reserve system transaction information, would not be appropriate in an environment of financial restraint.

The enquiry module of the circulation system was designed, therefore, with self-instructing display screens which lead naturally or sequentially from one command, instruction or question to another. Each set of functions is displayed in a 'menu' from which the user selects the key which he desires. After locating a wanted title, (book or document), the user can then move to another set of functions which allows him to determine the location, status, and/or loan period for the book, and to place a hold on it if it is out in circulation. He may also inquire about his own borrowing record - whether he has books out, when they are due, amount of fines if any owing, etc.

If the student or faculty member becomes confused at any point in his use of the enquiry terminal, a simple action returns him to the first 'menu' or display, which begins the step by step instructions again.

All system functions are described in detail in Section VI of this report.

(c) Staff involvement.

From the implementation of its first automated system, the Guelph document system* in 1966, the Guelph Library staff was convinced that the most effective systems resulted if librarians and systems analysts shared in the design. The design team established for the circulation project reflected this view. (See above).

*This system is used cooperatively by the other university libraries in Ontario under the name CODOC.

In addition, librarians from the Catalogue and Documentation Divisions were constantly involved. The systems analysts concentrated on file structure and internal processing while the librarians were responsible for incorporating existing or desired circulation policies and procedures into the system

*DOBIS: Dortmunder Bibliothekssystem.

functions, and for ensuring that implications for Guelph cataloguing, acquisitions and document coding were recognized and encompassed in the original design.

Attention was also given to making certain that all library staff were kept aware of the developing circulation system, inviting suggestions and comments at informal or social sessions, as well as in regular Divisional staff meetings.

3. Equipment.

(a) Mini-computer.*

As described above the GEAC 8000 has 256K in its CPU processer, with two 300 megabyte disc drives enabling all files and systems to be stored and/or processed, on-line, simultaneously. Also connected to the mini-computer is a 125 inch per second magnetic tape drive, a 300 line a minute printer, and an intelligent communications controller, itself a microprocesser, with 32 communication ports and a CRT control console.

(b) Back-up facilities.

Back-up capability is provided by a GEAC 800 minicomputer, with 64K, two tape drives, 55 megabyte disc, and eight hardwired communication ports. This facility allows the Library to provide a degraded circulation service, accommodating the charging and discharging of books and the stopping of delinquent patrons. It does not allow file enquiry of the main circulation system.

(c) Terminals

The standard terminal* is an Informer 303 polliblock terminal with an intelligent CRT display,* typewriter keyboard* and light pen.*

The light pen, (produced by Intermec Corp.), attached to the terminal is used to read bar coded labels* on both the patron's card and the library material. One quick wanding in either direction is all that is normally required to read the bar code successfully. Advanced error checking capabilities all but eliminate the chances of either a wanding or transmission error from being undetected.

In addition to patron and book bar codes, all standard commands in circulation or file updating procedures may also be initiated by library staff through use of the light pen. The only use which patrons make of the light pen is to wand their own badges.

4. Software.

(a) Operating system.

The GEAC 8000 operating system facilitates the processing of bibliographic information by allowing complete variability of field and record structures. All fields in the records are bit-aligned, which means that only that number of bits required to store a particular data element is used. This fact, coupled with the use of advanced data compression techniques, allows not only efficient data storage but also high performance on the terminals. A very rapid response is possible because the volume of data transfer is much less than in the older, conventional main frame computer systems.

The operating system, albeit very comprehensive and powerful, runs in only 3K of CPU memory on the GEAC 8000.

(b) Language.

The GEAC operating system uses two languages:

(i)ZOPL, which is comparable to PLI, used to write system software;

(ii)UGLI, which is a high level file processing language, used to program the screen displays.

(c) File structure.

Further storage efficiencies are achieved in the file structure of the indexes, where only as much data as is necessary to differentiate from its neighbours is stored in any index entry. For instance, the circulation system has stored in it 700,000 bibliographic records including call number, all titles, all authors (personal and corporate) publisher, place, and imprint data together with all indexes and pointers necessary to support each item. In addition, work space is provided to handle a circulation load of more than half a million per year. This entire system consumes only 200,000,000 bytes.

(d) Data base management.

All data in the system are stored in what GEAC defines as wrapped files. The data definition for each field is stored in what is called a wrap table. This technique provides an additional level of data security in that a file in the wrapped state could not be used on any other computer. Data would appear in this instance as a long string of binary bits.

This technique further assists in data management in that any field can be modified in size or changed in definition simply by changing the tables in the field's wrap table. The next time the file is updated the change will have been accomplished.

UGLI, the GEAC processing language, is not only a language but also has facilities within it to provide for data base management and the application processers. There are two different operational levels, one for staff and one for patrons. The patron may query the system and perform certain functions but he cannot add data. The staff member may query the system and add or modify data as well as process them.

The maintenance processers produce and accept tapes, define definitions, create and modify data and reorganize files. The GEAC Library Circulation system creates new records but it does not throw any old records away.

(e) Device dependence.

In almost all instances the software described above is device independent. With the Informer terminals a certain device dependence has been allowed in order to minimize response time. This

*See Appendix I.

implies that additional routines would be required if different terminal devices were to be used.

(f) System security.

System security is accomplished in three ways:

(i) Specific functions can be assigned only to specified terminals. These can be varied according to time of day or to management requirements.

(ii) Important functions can also be limited in their use to designated staff members. This feature is controlled by the staff member's bar coded badge.

(iii) A third level of protection can be provided through use of passwords which are changeable at any time.

(g) Miscellaneous system capabilities.

(i) Response time in all inquiry functions averages 2 seconds, with less than three seconds the maximum. The terminal ports operate on 1200 baud lines. A response time of one second could be achieved by stringing one terminal to each port.

(ii) Normal routines include:

—distinguish multiple volumes and copies of same call number;

—handle up to 256 types of patron codes;

—vary length of loan period;

—identify a restricted or ineligible borrower;

—recognize holds and notify patrons;

—produce lists of holds in call number order and adjust the queue;

—place holds on all copies of a title or against a unique copy;

—overdues produced while system is operating. (GEAC 8000 has 9 partitions. One is used to run overdues);

—lists of overdues in call number order;

—access to patron fine history (for staff member [limited] or patron only);

—item directories by primary or secondary location.

(iii) Reserve system capabilities:

—charge books to a course or professor;

—circulate books hourly or a variation thereof;

—identify holds, fine overdues;

—generate notices daily;

—produce by course or professor directories;

—activate or deactivate previously identified course lists;

—management information (reserve) by course, item, or professor.

(iv) Management information (system):

—circulation statistics by time of day, week, month, and/or year, cumulated;

—recall and hold counts by date (time, etc.) and item;

—in library use (each item used in library - serial, book, document, etc. is wanded prior to re-shelving);

—identification of frequently or infrequently used material by type of borrower, location, terminal etc.

(v) Future flexibility:

—item file can be increased to 2 million;

—patron file can be increased to 500,000;

—terminals can be increased to more than 100 without degrading response time or adding additional hardware;

—system can be extended to remote locations on campus, using Library or other existing terminals;

—system can interface with others in a network environment.

VI. ON-LINE FUNCTIONS

Each terminal in the system offers a selection of functions which can be performed, these are displayed on the CRT in a 'menu.' The command format is a numeric one, and the display itself indicates to the user how to select a desired function from the 'menu', and how to proceed with each subsequent step or procedure.

Figure I illustrates the basic functions available in the system, showing the actual size of the terminal and subsequent illustrations are divided into Patron and Staff functions. All illustrations display the screen at 70 per cent of actual size.

A. Patron or public functions.

The University of Guelph Library patron - student or faculty member - has two basic functions and their related sub-functions which he may wish to perform: Item or book inquiry, ('3'), or borrower inquiry, ('4'). The inquiry function is displayed on the public use terminal screens automatically, on the assumption that this is the most common requirement of the patron.

1. Item or book inquiry, figures 2-19.

Figure 2 illustrates this original book inquiry display with its four options and numeric keys, and with a selection made, by entering '1' on the keyboard, to

BEST COPY AVAILABLE

Fig. 1

Fig. 2 SEARCH BY CALL NO.

BEST COPY AVAILABLE

search the Library file by call number. The command, SEND, initiates the next display.

Figure 3 shows the resulting display in which the user is asked to enter the call number.

Figure 4 indicates that he has entered a call number, and the SEND command executes the appropriate search of the file.

The patron having directed the system to search the record for an explicit call number, the system responds by displaying the call number and two lines of bibliographic record for each of three successive items. Figure 5 illustrates this response. The display of three items is intended to cover the situation in which the patron has miskeyed in a minor way. If it is present in the record, the keyed call number will head the list of three; if it is not present, the system will recall the first call number preceding that keyed to head the list.

The patron then has several choices. If the item he wishes is in the displayed list of three, he may key '1', '2', or '3' representing the position of the needed item in the list. He may key 'M' for the display of the next succeeding 3 items, or he may initiate a new search by keying 'E'. This latter choice does not limit the patron to a call number search, but returns him to the position illustrated in Figure 2.

If the patron determines that the item he wishes to query is on the list displayed and keys '1', '2', or '3', as the case may be, the resulting display (Figure 6) repeats the call number and bibliographic information, to assure the patron that he is searching the correct record. In addition it displays a status record for each copy of the item held in the University of Guelph Library System. The status record includes:

the copy number;

the location of each copy (McLaughlin or Veterinary Science Division);

the present status, i.e. in the Reserve Collection, in circulation to a patron, or in the Library;

the due date if the item is in circulation, and its typical loan period.

The display continues by offering the patron three further choices. He may end his inquiry of this item and proceed to an inquiry of his own record i.e. go to Borrower Inquiry, by keying '3' 'SEND', or initiate the search of another book by keying '2' 'SEND'. His third choice is to place a hold on the item displayed on the screen. To accomplish this he would key '1' 'SEND'. (Figure 7)

As a result of this choice, the patron is instructed to wand his badge (Figure 8). This permits the system to display the user's badge number, to check the corresponding record, and to display any pertinent information. (Figure 9)

The first message tells him that one or more books placed on hold by him on an earlier occasion are now available for him at the central pick-up station.

The second message repeats the information that a copy of the book he has been searching is presently located in the Library (i.e. not recorded as being in circulation to a patron), and asks if, under the circumstances, he still wishes to place the hold. The user may now opt to terminate the hold operation on the basis of the book's availability in the Library. To do so he would key 'N' 'SEND'. If, however, the book, though in the Library, is not presently on the shelf, and the user wishes to have it held for him, he may continue the function by keying 'Y' 'SEND'. This will assure him that the book will be captured in the reshelve procedure (all "in library use" books are wanded before being reshelved) and held for him at the central pick-up station.

The 'Y' response triggers an instruction to the patron to indicate the date after which the hold will no longer be required, and indicates the format in which the date must by keyed (YYMMDD), two numerics for year, two for month, and two for day. (Figure 10) Figures 11 and 12 show typical responses to the placement of a hold by a patron. Figure 11 shows the display response of the system when there is no impediment to the operation reflected in the borrower's record. The system confirms that the hold has been placed, and advises the patron to check his record in 'Borrower Inquiry' frequently.

Figure 12 illustrates the response if the patron attempts to place a second hold on an item already recorded as being on hold to that borrower number. It generates two messages; the first reminds the user that he has already placed a hold on the book in question, the second tells him that the second hold has not been permitted. A similar set of messages would have been generated had the borrower attempted to place a hold on a book charged-out to him at the time.

As seen in Figure 2, the Book Inquiry function offers the patron four options, each with a corresponding numeric key. The succeeding Figures 3-12 have followed the development of one choice, the search for an item by call number, initiated by keying '1' 'SEND'. Figures 13-19 illustrate the development of searches for the same item successively by author and title.

By keying '2' 'SEND' the patron has informed the system that he wishes to search the record by author. (Figure 13) The system responds (Figure 14) by instructing the user to enter the author information and then to press 'SEND'. When this act is completed (Figure 15) a display of three successive items in alphabetic order by author is produced. (Figure 16) From this point on, the progression and choices are identical to those illustrated in the call number sequence. (Figures 6-12)

Similarly, a search by title would begin by keying '3' 'SEND' resulting in the display shown in Figure 17. Again, compliance with system directions (Figure 18) produces the display of three successive items in alphabetic sequence. This time, however, the list is in title order. (Figure 19) And, once again, the pattern shown in Figures 6-12 is repeated.

The patron's final choice in this mode of operation is the depression of '4' 'SEND' which will take him out of Book Inquiry function and place him in the Borrower Inquiry function where he is able to check the status of his record and its various components.

BEST COPY AVAILABLE

Fig. 3

Fig. 4

BEST COPY AVAILABLE

Fig. 5

Fig. 6 PLACING A HOLD

BEST COPY AVAILABLE

Fig. 7

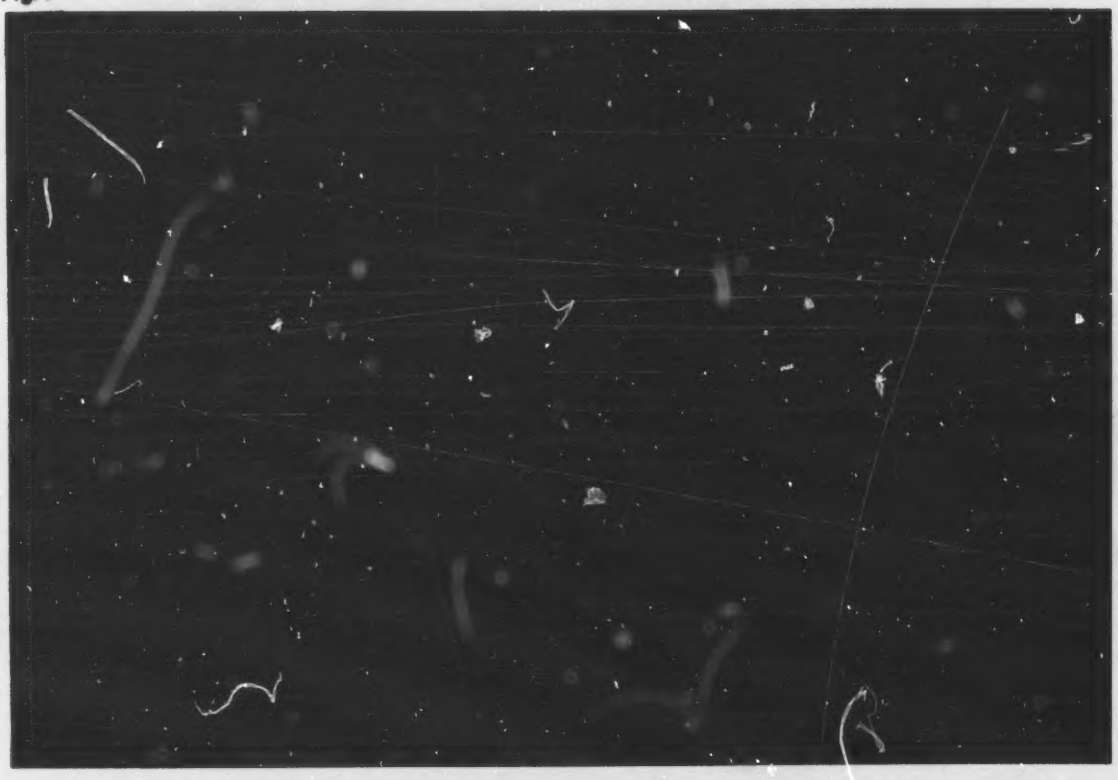


Fig. 8

BEST COPY AVAILABLE

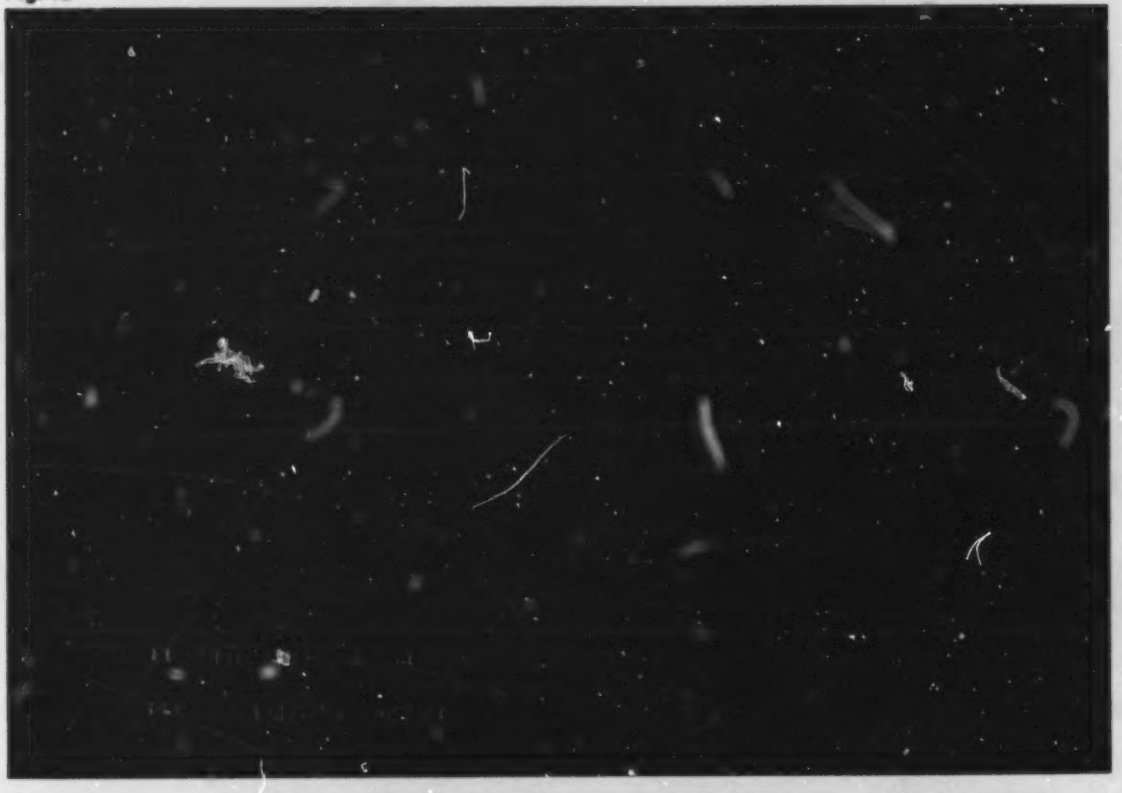
Fig. 9

Fig. 10

BEST COPY AVAILABLE

Fig. 11

Fig. 12



BEST COPY AVAILABLE

Fig. 13 SEARCH BY AUTHOR

Fig. 14

BEST COPY AVAILABLE

Fig. 15

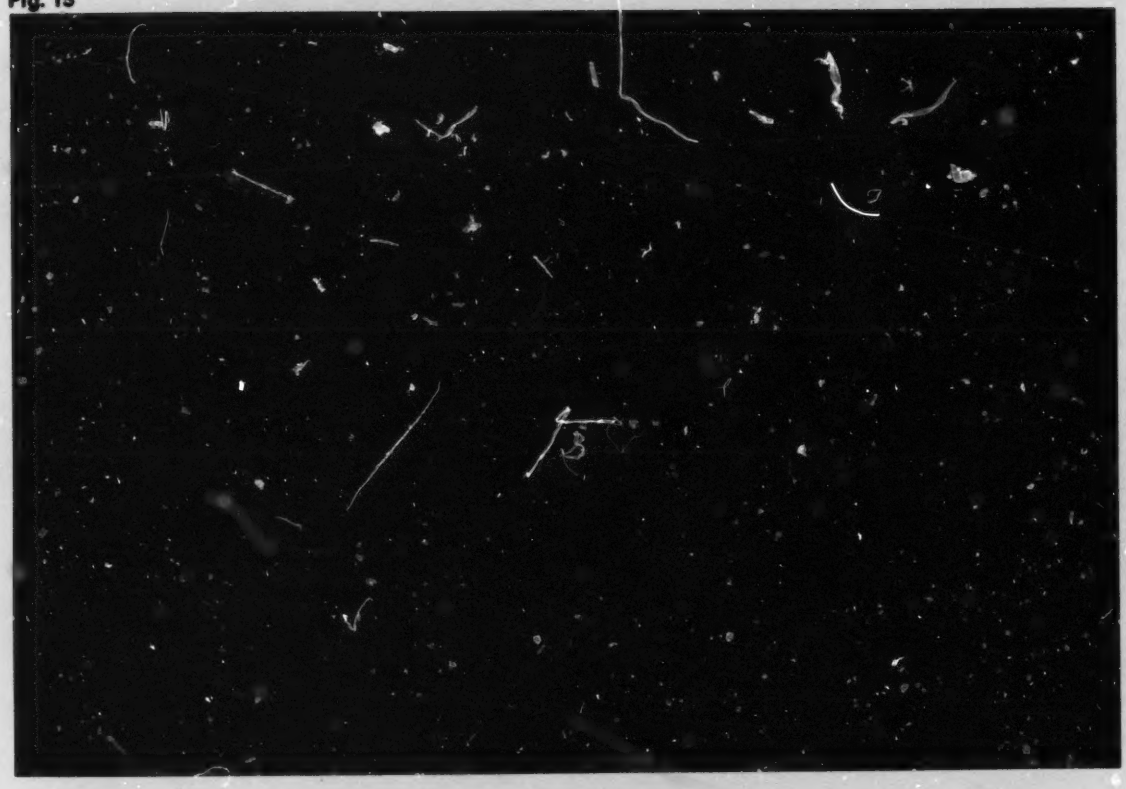
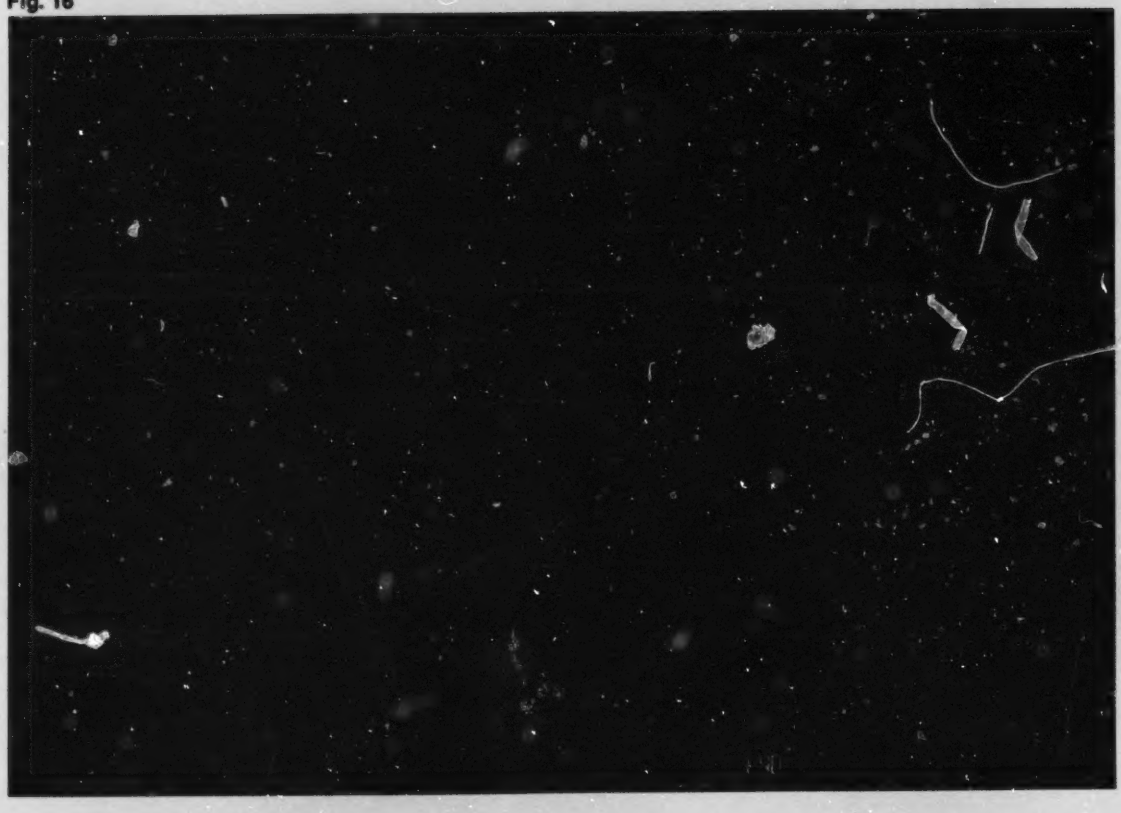


Fig. 16



BEST COPY AVAILABLE

BEST COPY AVAILABLE

Fig. 17 SEARCH BY TITLE

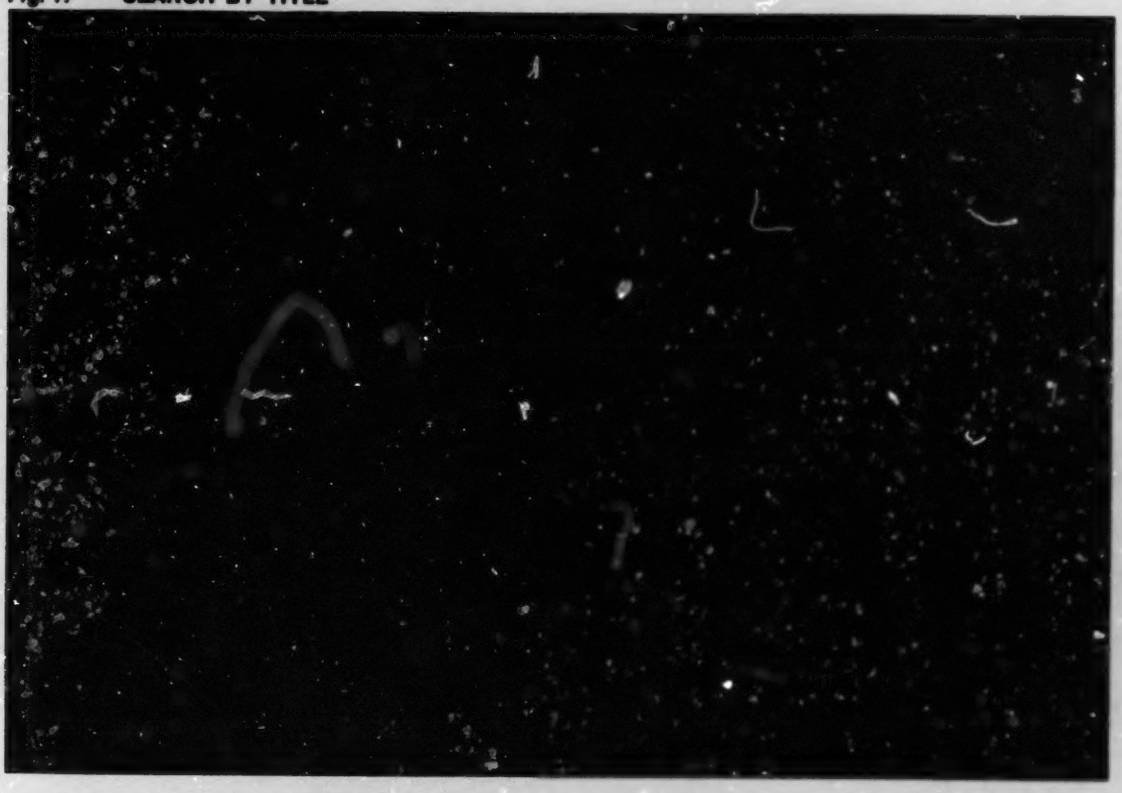
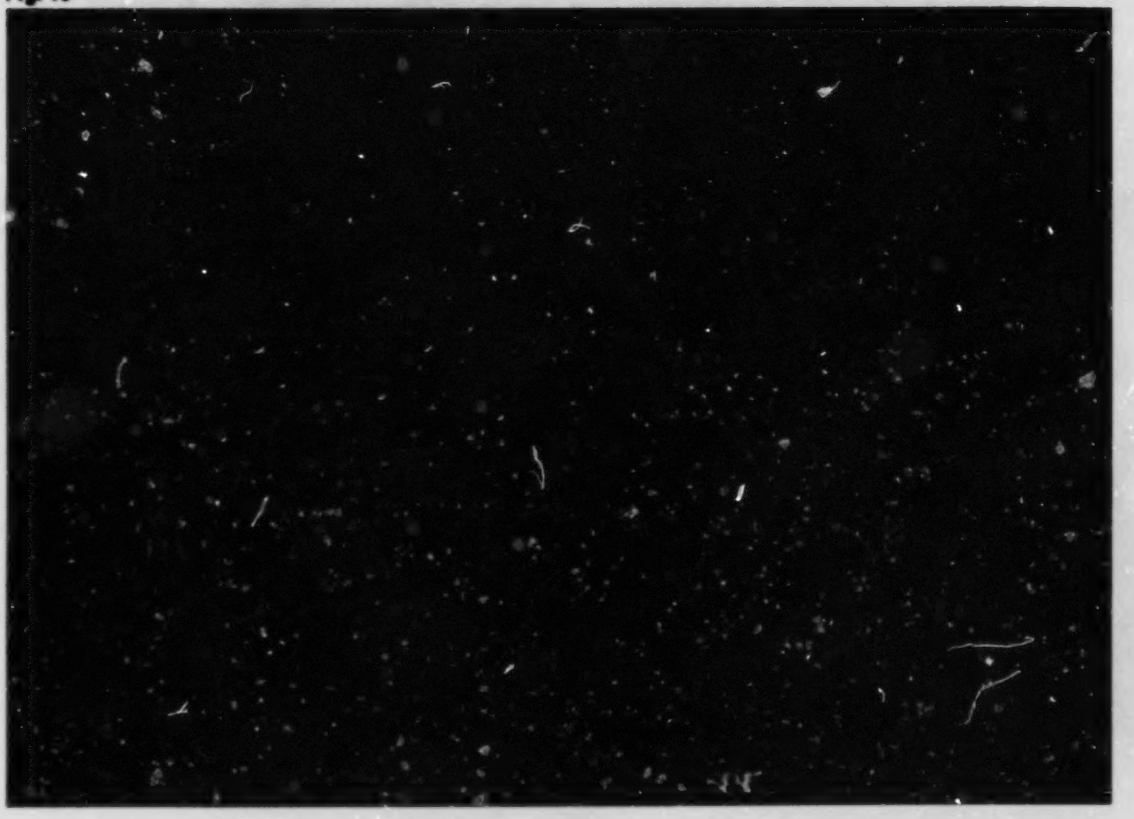


Fig. 18

BEST COPY AVAILABLE

Fig. 19



2. Borrower inquiry, Figures 20-34.

The principles of the Borrower Inquiry function are similar to those in Book/Item Inquiry, and are illustrated with the screen displays which follow. Note that having wanded his badge the patron may request, in addition to his general status, a listing, item by item, of all material checked out to him, with particular status, (e.g. semester loan), due date, etc. (Figures 23, 24)

Figure 25 informs the patron that a semester loan has been recalled.

Figures 26-27 are the last two loans for the patron.

Figures 28-30 display all holds which the patron has placed and their status.

Figure 31-33 is the FINE DISPLAY sequence, in which the patron is told which titles he has had overdue, what the due date was, when he returned the book, and the amount of the fine. He is also informed what procedures to follow if he disagrees with the fine assessment.

Specific mention should be made of the caution exercised to avoid allowing anyone else to have access to any patron's fine information except himself. Entering a '6' after the initial personal record display will erase the screen, (Figure 21), or an 'EXIT' command at anytime will accomplish the same purpose.

B. Staff Functions.

As shown on Figure I, there are 12 staff functions. These are described below briefly, primarily with illustrations of the CRT screen displays.

1. Charge/renewal, Figures 34-39.

In this mode the system performs one of the basic functions of any library, the lending of library materials or the renewal of this privilege.

In order to do this effectively the Charge/renewal program has immediate access to both the borrower file and the item file. This access permits the system to check any restrictions against the borrower or the item, or permits the transmission of special messages to the borrower. (See Information Messages, VII, 3, below.)

Statistics are accumulated.

2. Discharge/reshelve, Figures 40-42.

Every item removed from a shelf and left for staff reshelving, whether or not it has been "charged-out" to a borrower, must be processed in this mode. Because it has direct access to the item file, the Discharge/reshelve function can accomplish several tasks.

First, it notes the date and time of return of a borrowed item, triggering the assessment of fines

BEST COPY AVAILABLE

Fig. 20

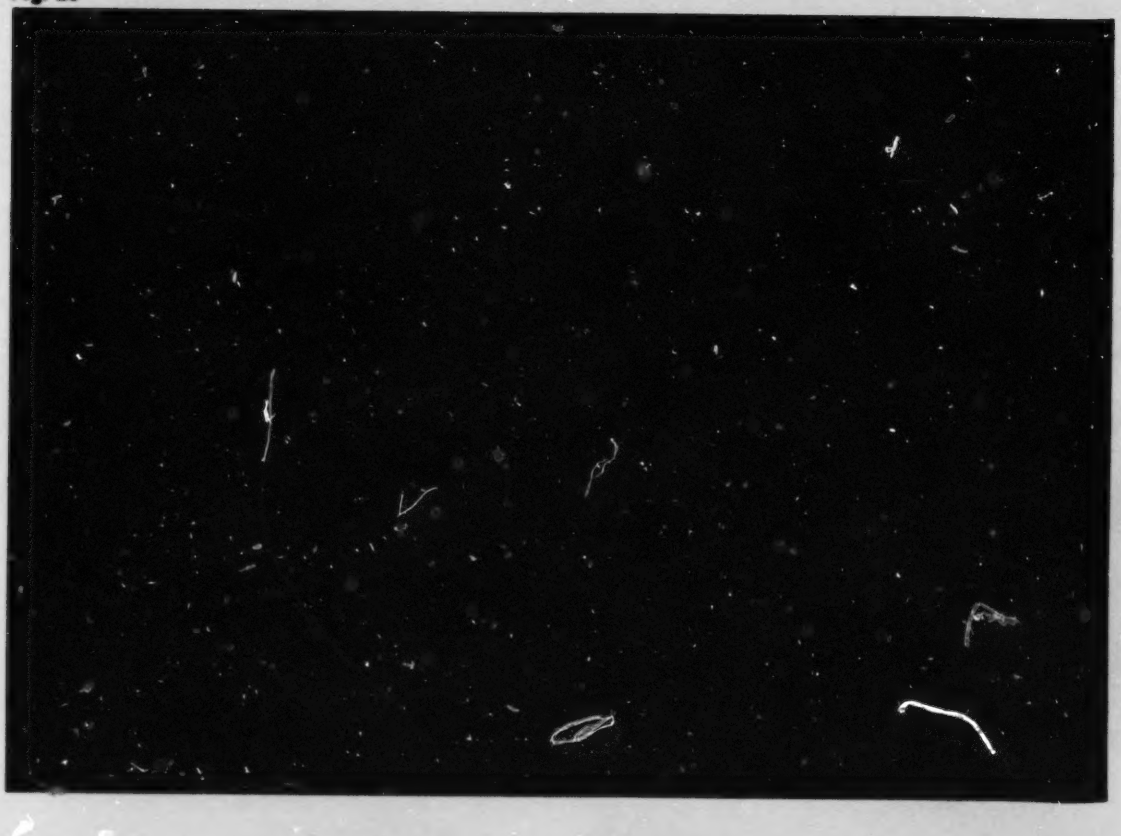


Fig. 21

BEST COPY AVAILABLE

Fig. 22

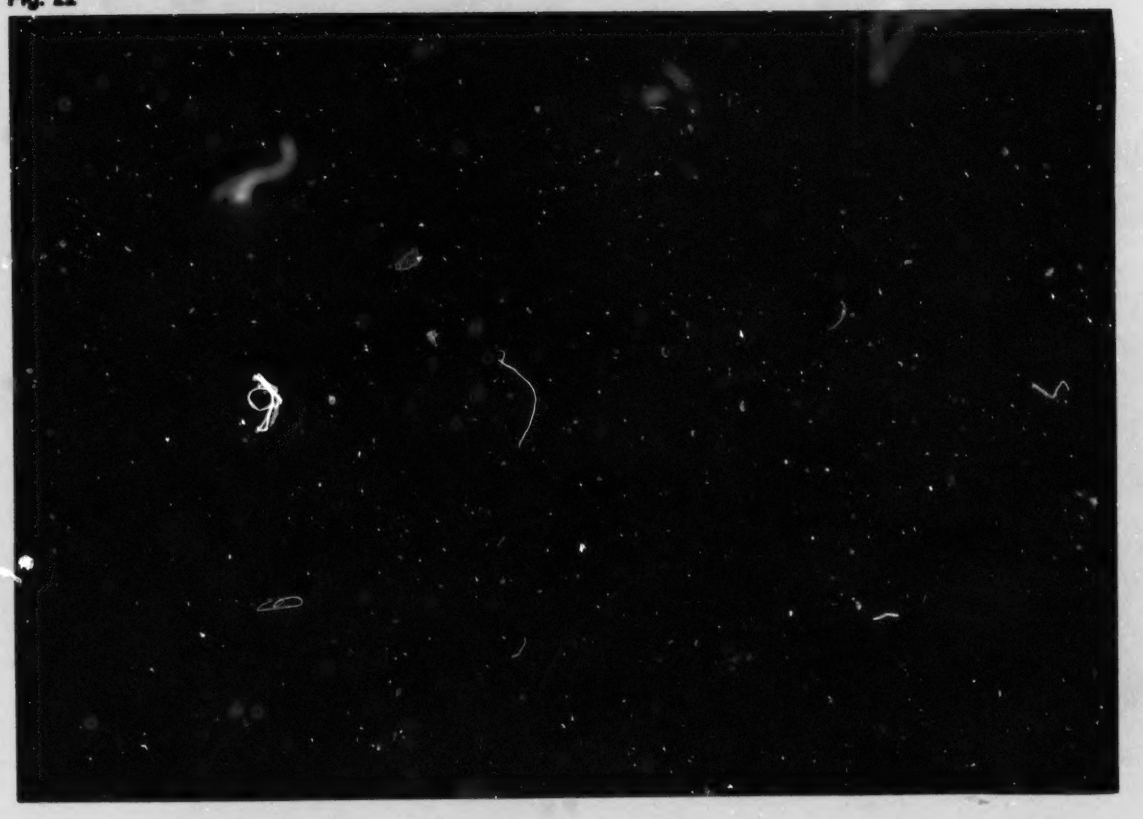
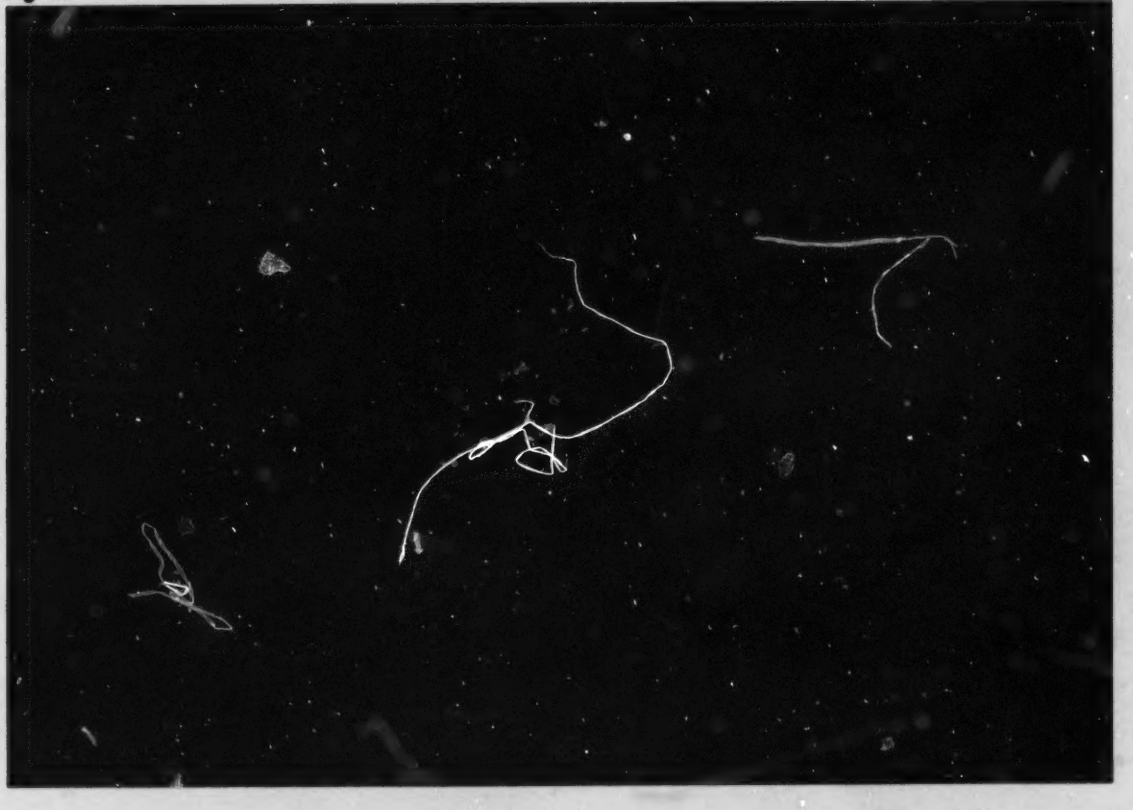


Fig. 23



26 BEST COPY AVAILABLE

Fig. 24

Fig. 25

BEST COPY AVAILABLE

Fig. 28

Fig. 27

COPY AVAILABLE

Fig. 28

Fig. 29

COPY AVAILABLE

Fig. 30

Fig. 31

BEST COPY AVAILABLE

Fig. 32

Fig. 33

BEST COPY AVAILABLE

Fig. 34

Fig. 35

BEST COPY AVAILABLE

Fig. 36

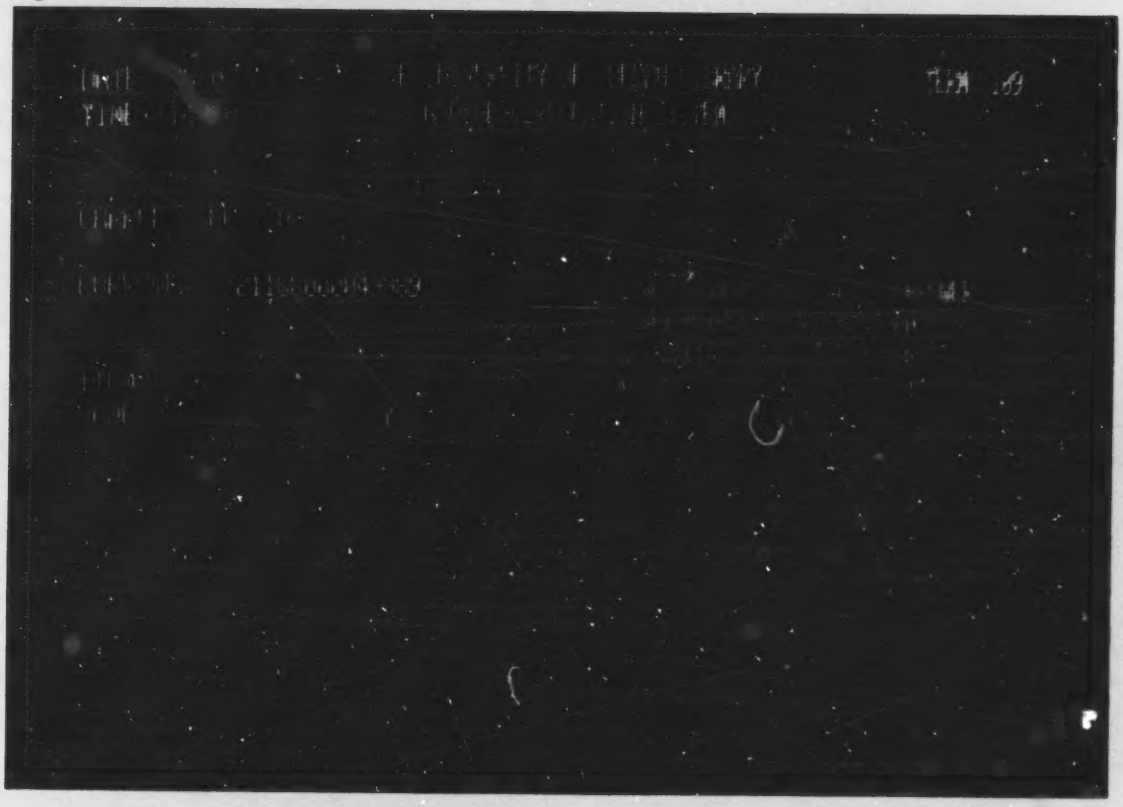
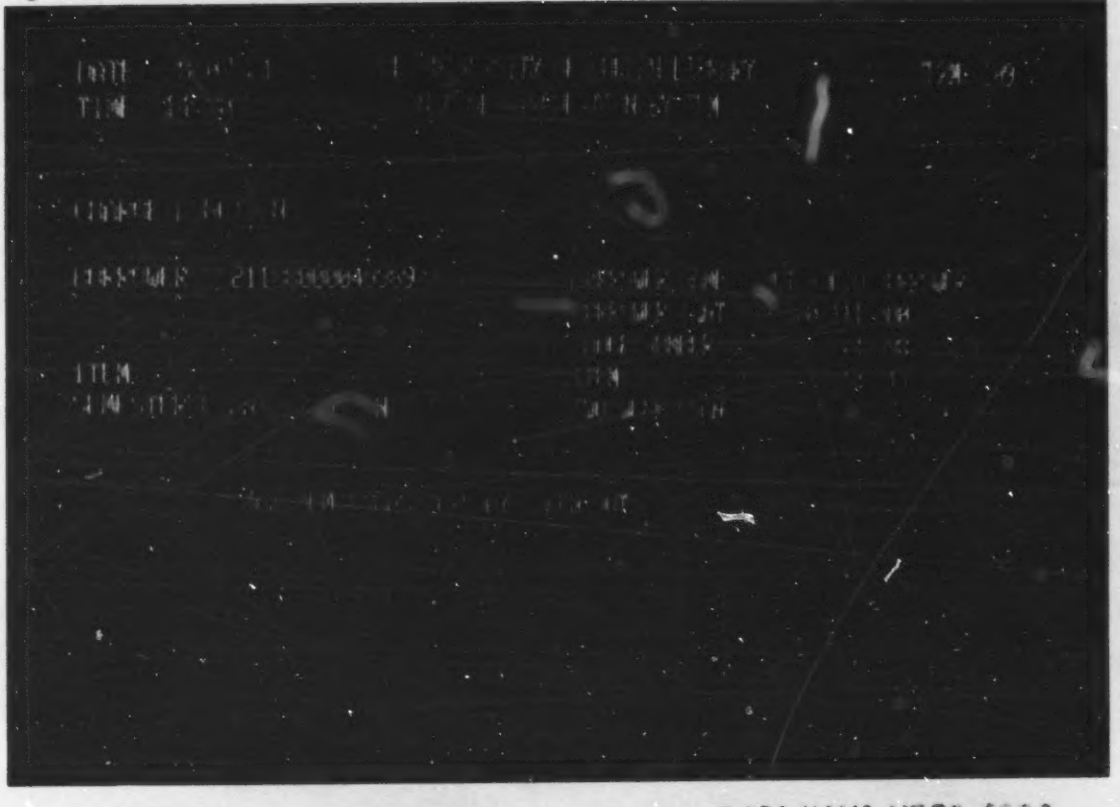


Fig. 37

BEST COPY AVAILABLE

Fig. 38

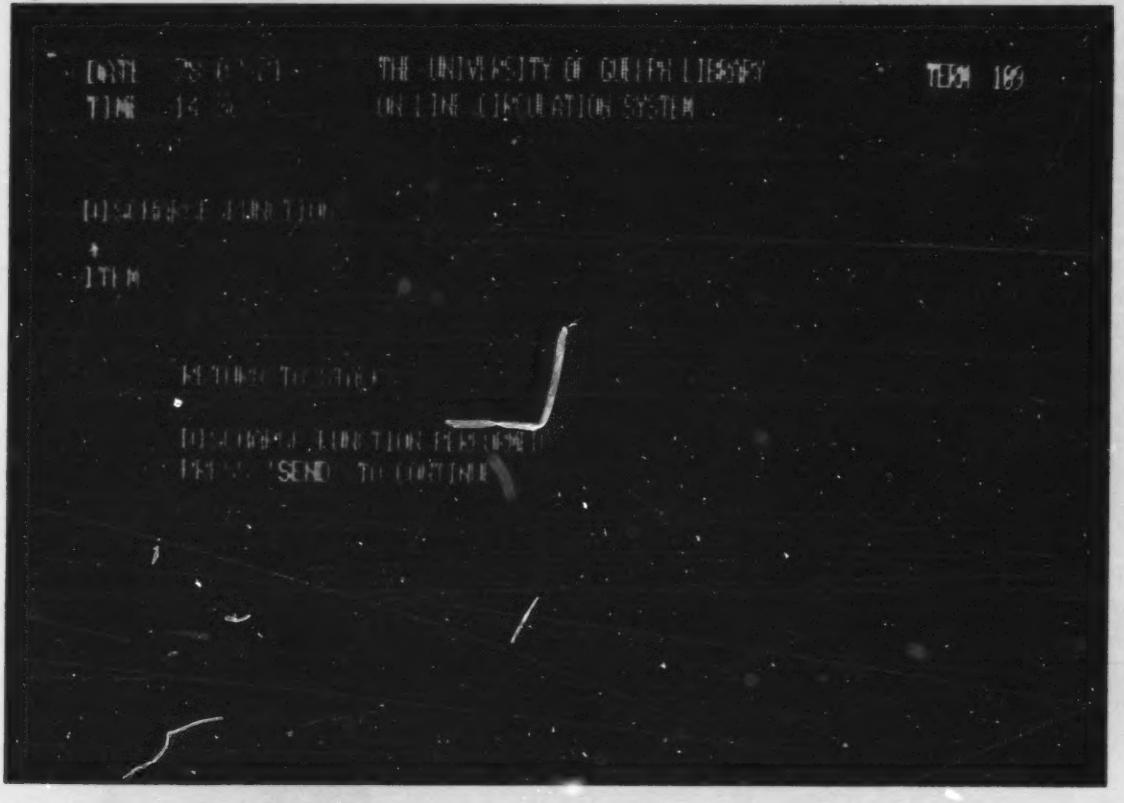
Fig. 39



BEST COPY AVAILABLE

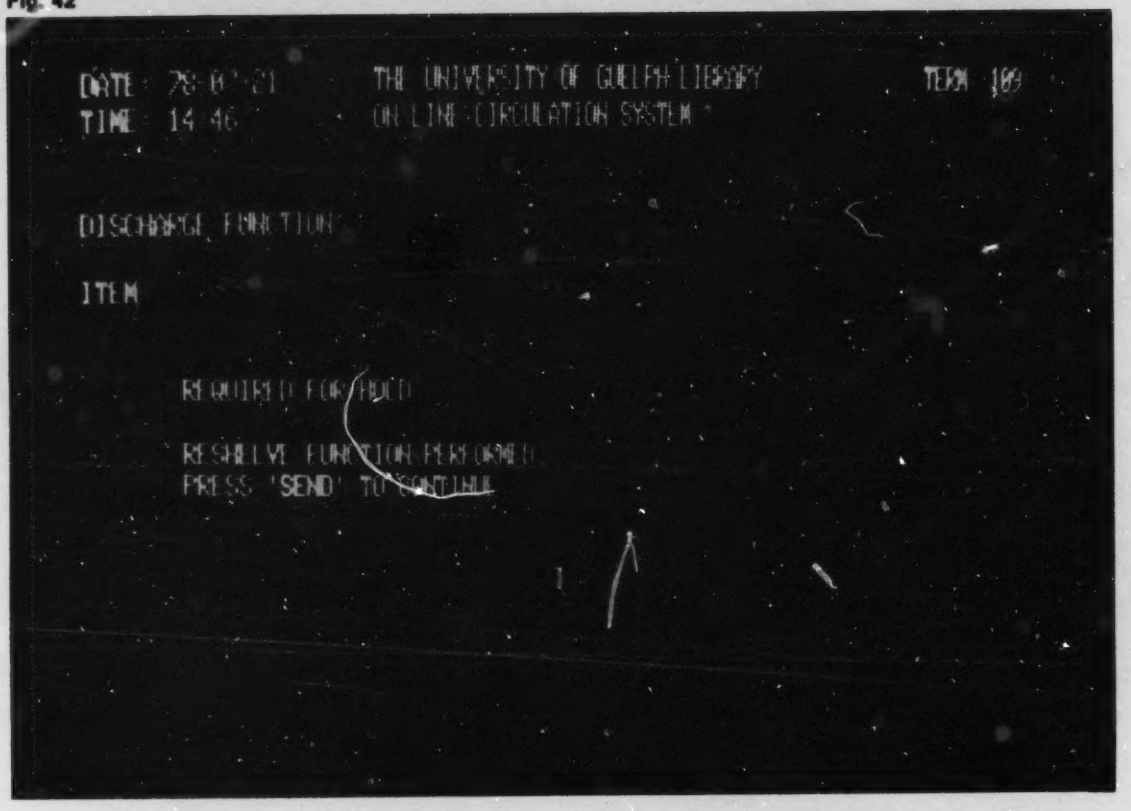
Fig. 40

Fig. 41



BEST COPY AVAILABLE

Fig. 42



where appropriate. Second, it captures items required for special reasons, e.g. binding, hold, recataloguing, reserve, etc. Third, it collects and assembles statistics on items used whether they were used in-house, or "charged-out" and returned by a borrower.

3. and 4. Public or patron functions. These are detailed in the previous section, above.

5. Borrower validation. (See 6 below.)

This function is, in effect, a subset of borrower maintenance, and permits the activation of new patron's accounts and the reactivation of some "lapsed" accounts. It adds relevant personal information to an account, and ties that account to a unique bar-code.

6. Borrower maint(enance), Figures 43-51.

This is the borrower file containing complete up-to-date information on the status of the borrower. If questions arise respecting the validity of information held in a borrower's file, staff with proper credentials may open the file and make appropriate adjustments. This would include enquiries into or payment of fines, as well as name and address adjustments, or the valid up-dating of other kinds of information.

7. Item maint(enance), Figures 52-55.

In this mode, the system is enquiring into the circulation file. It permits the entry of limited catalogue copy, and the editing or updating of existing records.

8. Hold maint(enance), Figures 56-60.

The Hold Maint(enance) function permits access to portions of both the Borrower File and the Item (Book) File.

In the Borrower File option it is possible to inquire (INQ) into the status of any "holds" placed by a given borrower; to update the record or to cancel any of his holds; to place a "hold" on the record for him, or to charge it out to him when he picks it up. (PIC)

In the Item (BOOK) File option, the system allows inquiries into the "hold" status of any item and the updating or cancellation of selected portions of that record. It also allows "holds" to be placed against a given item, or, when the item becomes available, to mark it as satisfied. (SAT)

9. Reserve Maint(enance), Figures 61-65.

In Reserve Maint(enance) mode, the system allows access to the Item (BOOK) File.

Through a series of pointers it pseudo-constructs a file of items held on '2' hour reserve. It permits the addition/deletion, the activation/deactivation, and the updating of any records pertaining to the Reserve operation.

10. Supervisor Maint(enance), Figures 66-68.

This mode of operation is so structured that it gathers relevant data from all other functions. In this way Supervisors can review the activity in those functions affecting their area(s) of responsibility, thus pinpointing the source of problems which may arise as a result of that activity. It will also permit a Supervisor to monitor the progress of operative staff, determining the level and kind of instruction that may be required.

BEST COPY AVAILABLE

Fig. 43

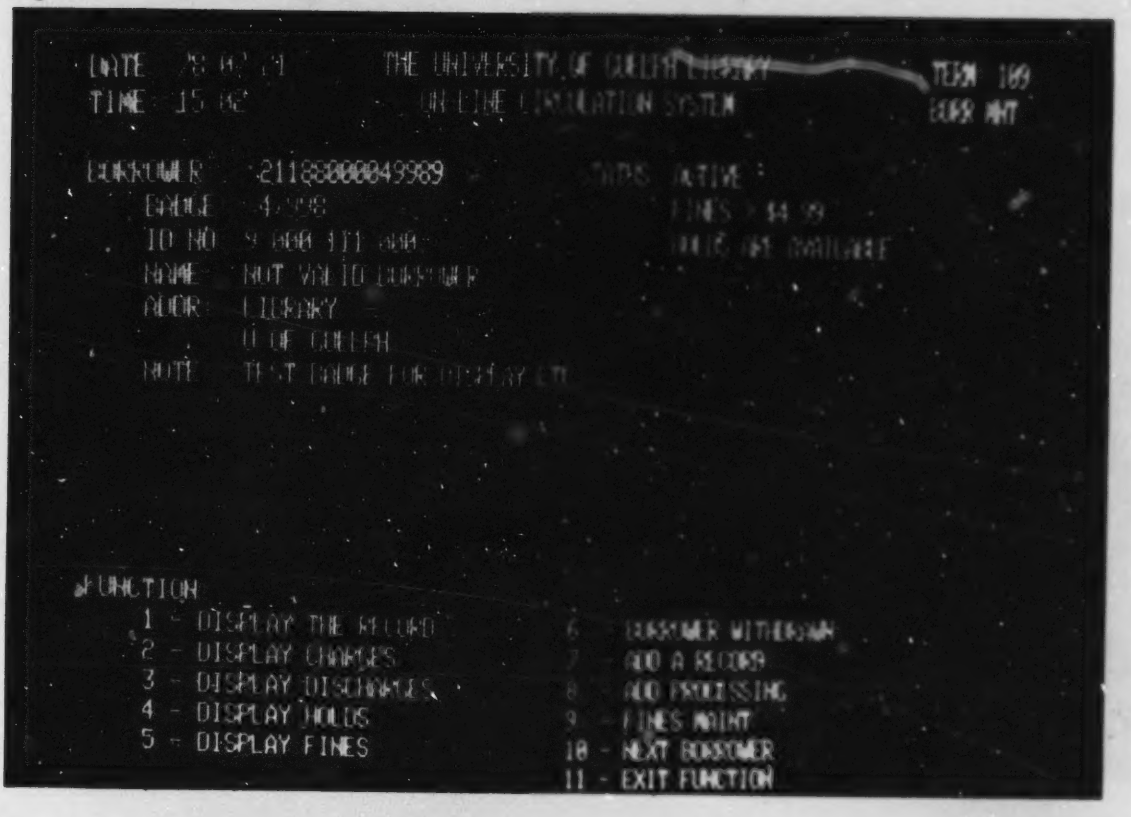


Fig. 44

BEST COPY AVAILABLE

Fig. 45

Fig. 46

BEST COPY AVAILABLE

Fig. 47

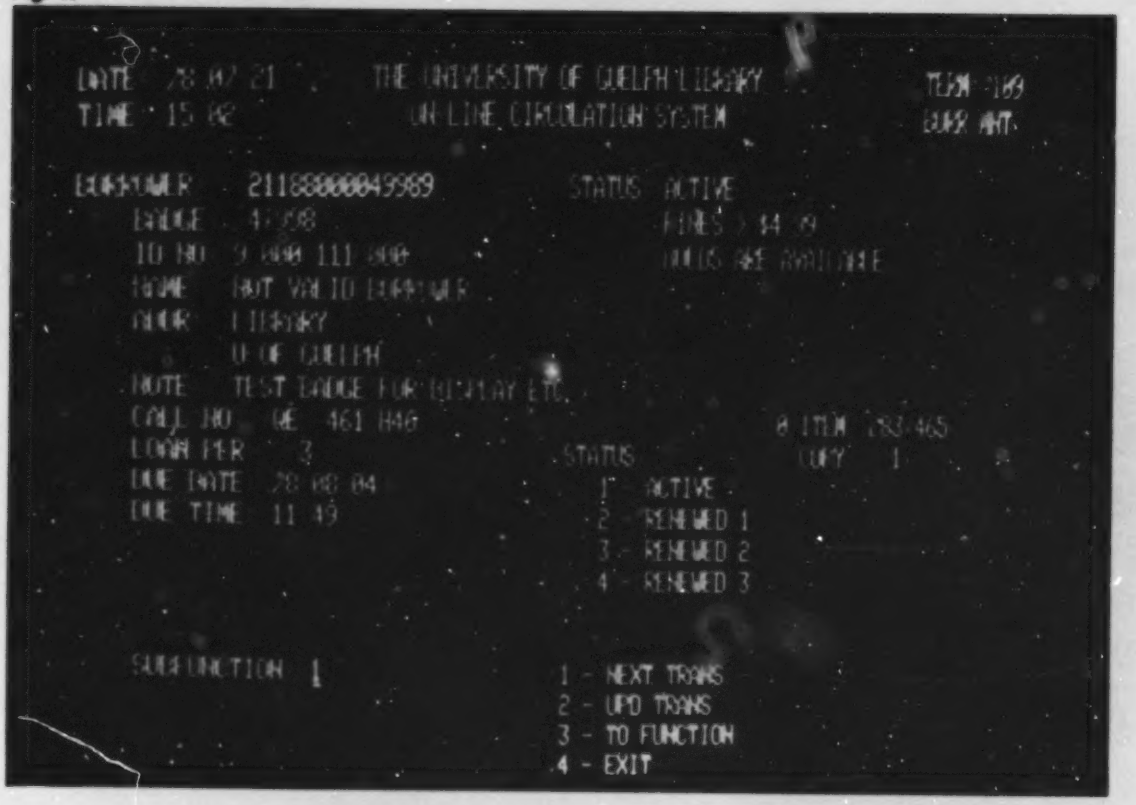
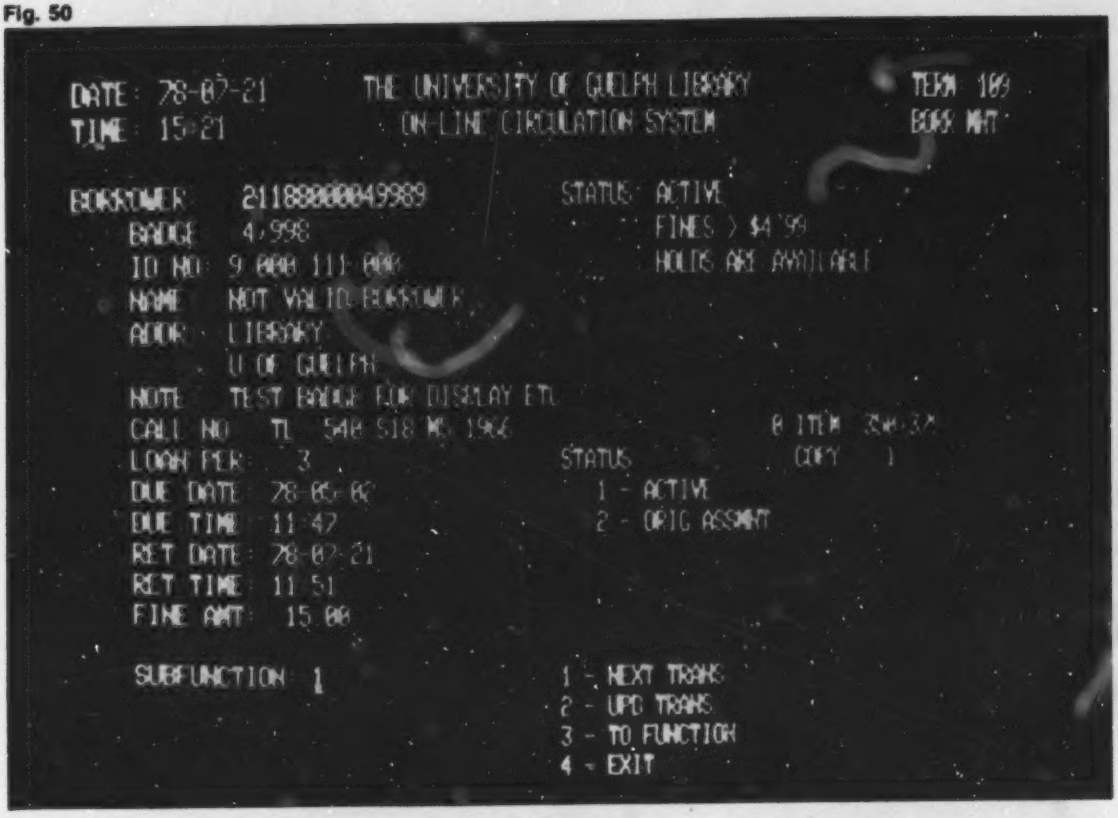


Fig. 48

BEST COPY AVAILABLE

Fig. 49

Fig. 50



BEST COPY AVAILABLE

Fig. 51

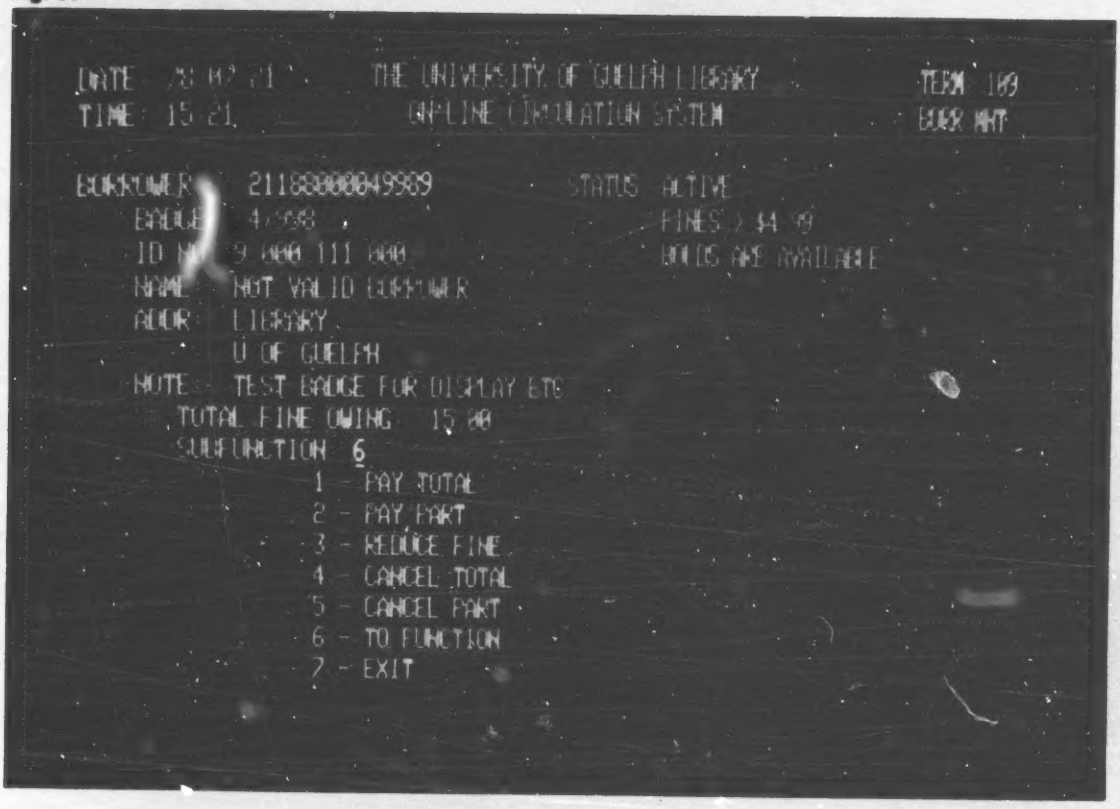
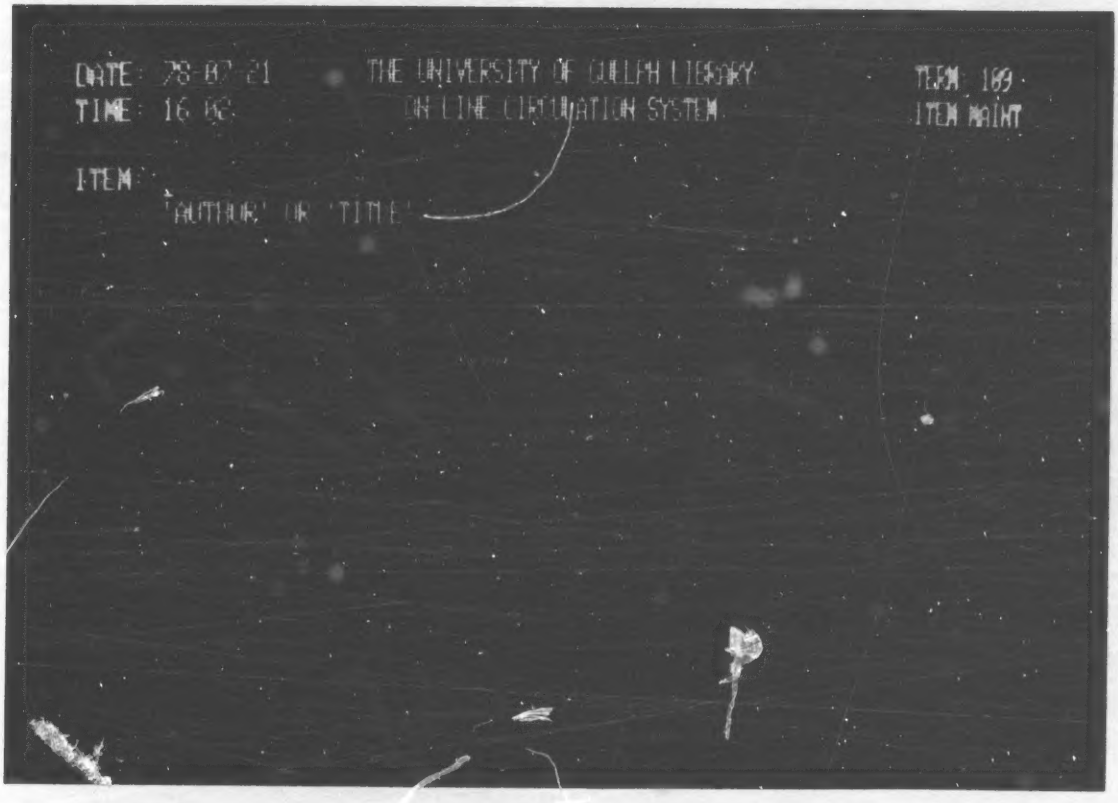


Fig. 52



BEST COPY AVAILABLE

Fig. 53

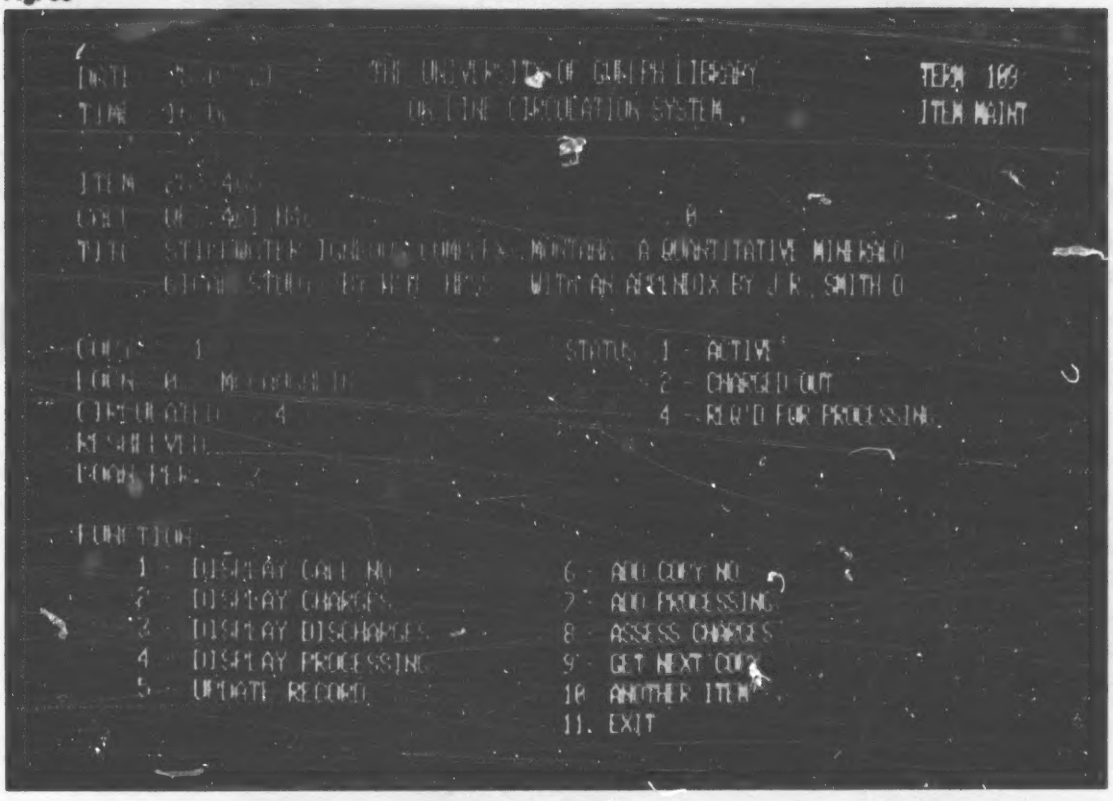
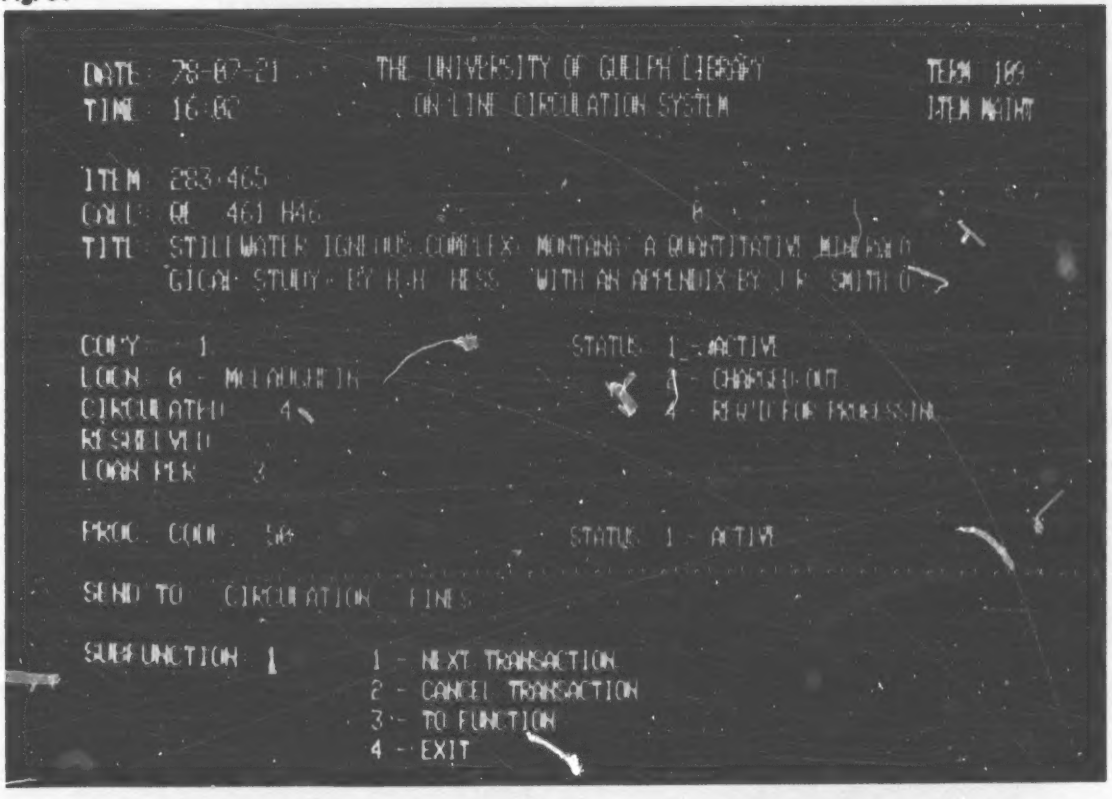


Fig. 54



BEST COPY AVAILABLE

Fig. 55

Fig. 56

BEST COPY AVAILABLE

Fig. 57

Fig. 58

BEST COPY AVAILABLE

Fig. 59

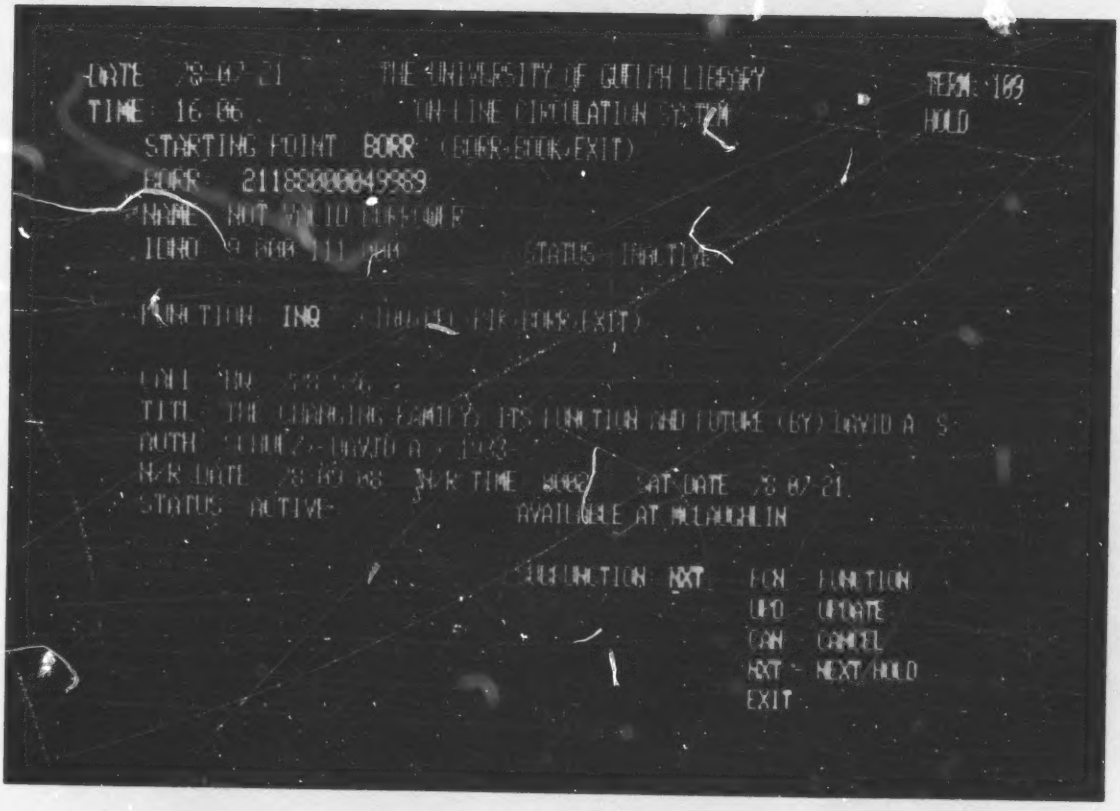

DATE 78-07-21
THE UNIVERSITY OF GUELPH LIBRARY
TERM 103
TIME 16:06
ON-LINE CIRCULATION SYSTEM
HOLD
STARTING POINT BORR (BORR/BOOK/EXIT)
BORR 211888888049989
NAME NOT VALID BORROWER
IDNO 9 0000 111 0000 STATUS INACTIVE
FUNCTION INQ (INQ/PLC/PIK/BORR/EXIT)
CALL NO
TITL THE CHANGING FAMILY; ITS FUNCTION AND FUTURE (BY) DAVID A S
AUTH SCHULZ, DAVID A , 1933-
N/R DATE 78/08/08 N/R TIME 0000 SAT DATE 78/07/21
STATUS ACTIVE AVAILABLE AT MCLAUGHLIN
SUBFUNCTION NXT
FCN FUNCTION
UPD UPDATE
CAN CANCEL
NXT NEXT HOLD
EXIT

Fig. 60

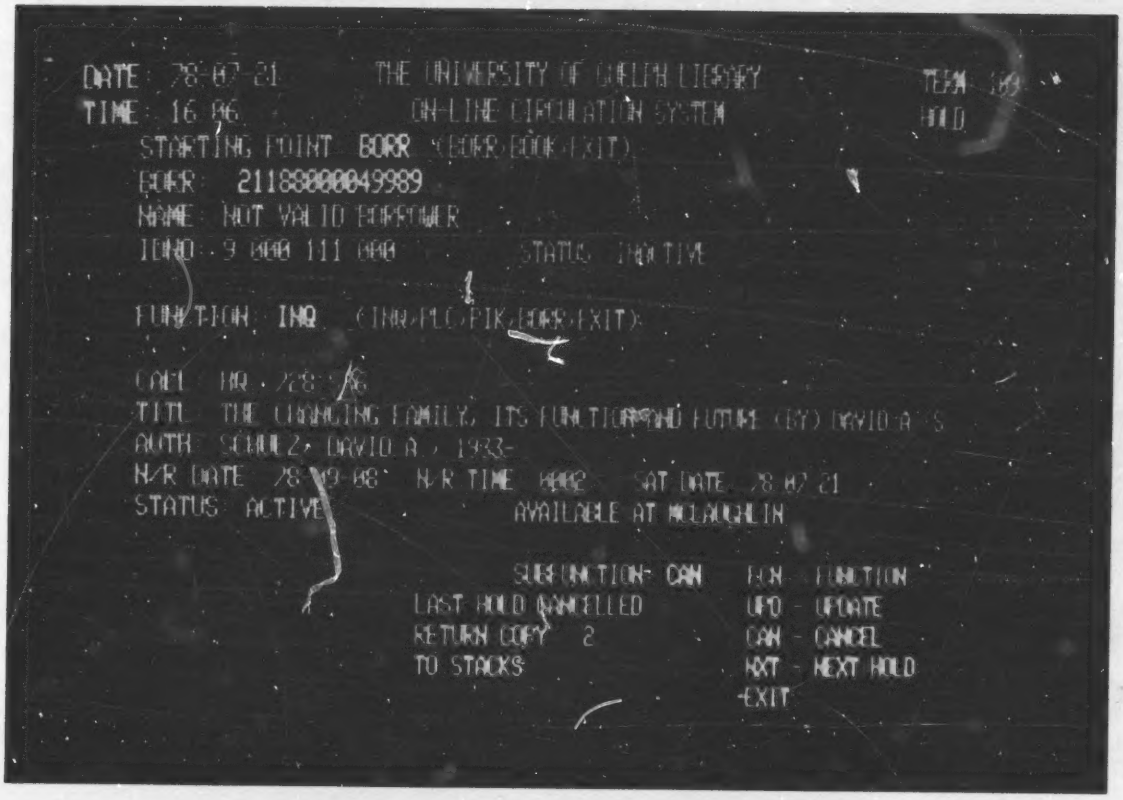

DATE 78-07-21
THE UNIVERSITY OF GUELPH LIBRARY
TERM 103
TIME 16:06
ON-LINE CIRCULATION SYSTEM
HOLD
STARTING POINT BORR (BORR/BOOK/EXIT)
BORR 211888888049989
NAME NOT VALID BORROWER
IDNO 9 0000 111 0000 STATUS INACTIVE
FUNCTION INQ (INQ/PLC/PIK/BORR/EXIT)
CALL NO
TITL THE CHANGING FAMILY; ITS FUNCTION AND FUTURE (BY) DAVID A S
AUTH SCHULZ, DAVID A , 1933-
N/R DATE 78/08/08 N/R TIME 0000 SAT DATE 78/07/21
STATUS ACTIVE AVAILABLE AT MCLAUGHLIN
SUBFUNCTION: CAN
LAST HOLD CANCELLED
RETURN COPY 2
TO STACKS
FCN FUNCTION
UPD UPDATE
CAN CANCEL
NXT NEXT HOLD
EXIT

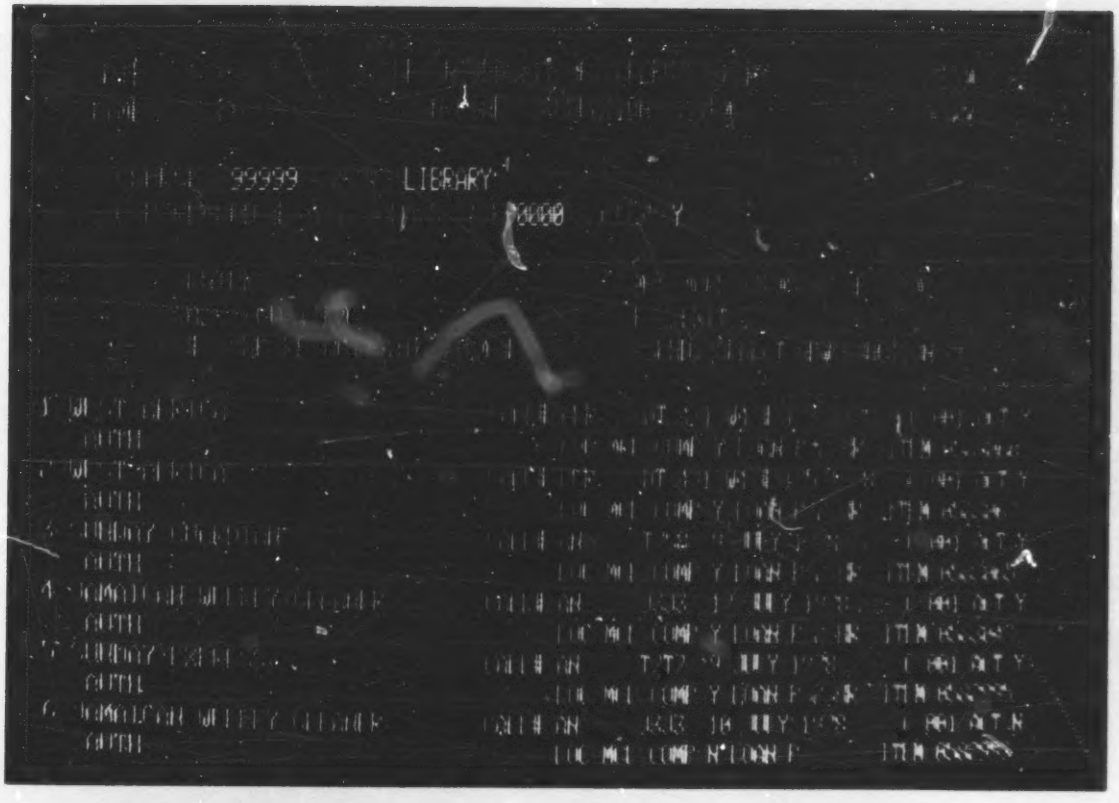
Fig. 61

Fig. 62

BEST COPY AVAILABLE

Fig. 63

Fig. 64



BEST COPY AVAILABLE

Fig. 65

Fig. 66

BEST COPY AVAILABLE

Fig. 67

Fig. 68

BEST COPY AVAILABLE

11. Calc(ulate) Check Digit, Figure 69.

The Calc Check Digit function contains an algorithm which does a variety of calculations on the pre-established numbers to be assigned in a bar-code. The resulting digit will be added to the bar-code number as a check digit. If, in any "wanding" operation, the numbers should be misread the check digit requirements will not be met, and the system will identify a "misread" situation. Only when the calculations on a bar-code number equate to the check digit will the information received be accepted.

12. System notes, Figure 70.

As changes are made to the various functions within the system, it is imperative that the operators affected be informed. In lieu of memos which might be lost or misplaced, the terminal is used as a mode of communication with the operator.

In this mode, the Systems Analysts effecting changes to any function can communicate relevant information to those who must use that function.

13. Bar-code tester, Figures 71-74.

This mode of operation was established not so much for testing bar-codes, a task for which it is well suited, but for testing the reading accuracy of the wands.

Having passed the wand over an acceptable bar-code label for a number of times, the operator, by typing in the appropriate request, can have the resulting statistics printed on screen. If an unacceptable error rate is shown, the wand must be marked for service.

14. Biblio search, Figures 75-77.

This is a test program, and illustrates how untried procedures can be tested on-line. In this case the basic stated requirements for bibliographic search of existing library records were assembled into an operational unit, and mounted on-line. This unit can now be tested against the pragmatic needs of the bibliographic search operators, and the program updated to meet those needs.

VII. IMPLEMENTATION

Planning for implementation of the GEAC Library Circulation System in the University of Guelph Library began as soon as the design phase was operating smoothly. The first task was to ensure that all books and documents received bar code labels. Identification of implications for library operating procedures was also an early priority since many routines affected by the new system (loan periods, fines, etc.) were Senate policies and any changes would require Senate approval.

It was planned to have the new circulation system operating in parallel mode with the existing off-line

Fig. 69

BEST COPY AVAILABLE

Fig. 70

Fig. 71

BEST COPY AVAILABLE

Fig. 72

Fig. 73

BEST COPY AVAILABLE

Fig. 74

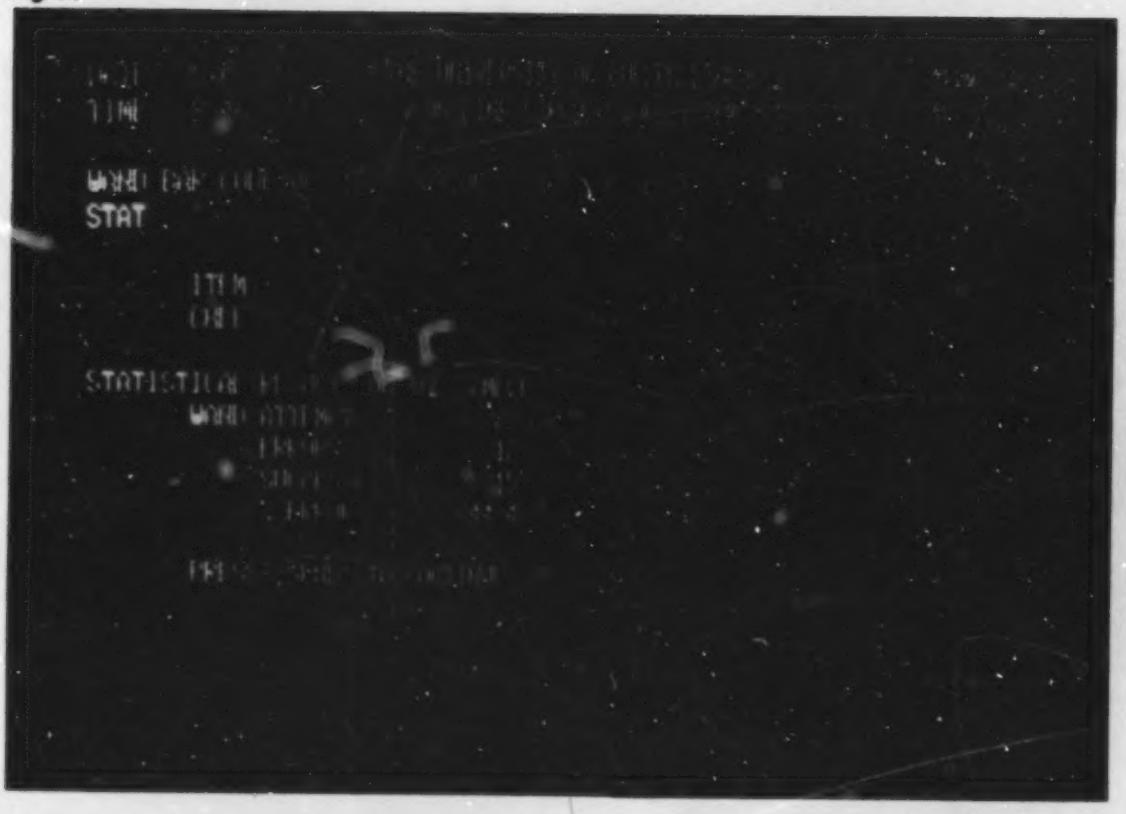


Fig. 75

BEST COPY AVAILABLE

Fig. 76

Fig. 77

BEST COPY AVAILABLE

system for at least two months of the Spring semester, 1977, with full implementation, but in a test environment, projected for September, 1977, the beginning of the Fall semester.

1. Bar code labeling project.

The bar code labels, using the Monarch CODABAR structure, Nashua label stock, and CLSI* label format were produced in the Guelph Library from the existing machine readable bibliographic files. An Intermec bar code printer driven by the GEAC 800 computer (see Equipment, above) produced 1200 labels an hour.

It was realized that the labeling project for more than 500,000 books and documents could be best accomplished when students were absent from campus. Since Guelph is a three semester university this opportunity occured from April 15-30, 1977, the break period between the Winter and Spring/Summer semesters.

*CLSI (Computer Library Systems Incorporated.)

Accordingly, a project team of 100 staff members taken from all non-essential library tasks was identifed in early April and given an orientation program in the planned bar code labeling routines. 'Non-essential' library staff were defined, for this project, as all staff members - librarians, support staff, administrative staff - who were not needed for the circulation desk, receiving office or serials check-in duties.

When the project actually began each team member was assigned a book truck containing:

—a role of bar code labels in call number order;

—a roll of Mylar tape to apply over the label as a protective cover;

—paper clips and a box to handle labels for which the book was not on the shelf.

During the labeling, any books for which a label had not been produced was removed from the shelf and placed on the book truck.

At each half day interval the team member took his/her truck with unmatched labels and books to the bar code label project headquarters. This was a Library Conference Room set aside for the project for a two week period. Staff members who were not physically able to participate in the labeling exercise were stationed in the headquarters room and were occupied keeping unmatched books and labels in call number order. The labels were affixed to sheets of waxed paper 8½ x 11 inches, and then placed in three-ring binders. This provided an easy and safe device for holding the labels until they could be matched with the appropriate book.

It should be noted that there were several reasons for some non-matching. Hundreds of books were still out in circulation. Many more could be assumed missing but their records had not been deleted from the files. Further numbers were in different locations within the Library, e.g. restricted circulation, reserve desk, etc. Books without labels printed resulted, in part, from the earlier participation by Guelph in the ONULP project: it was recognized that some records had never been merged into the Guelph files, and, in addition, some errors in the files were anticipated.

The major part of the labeling was accomplished in less than two weeks, with staff members averaging 120 labels and Mylar strips an hour. (Some staff were able to label and strip as many as 300 an hour.)

2. Policy implication and definition.

It was recognized in the planning stage that the new circulation system would allow changes in operating routines which were under the jurisdiction of the University of Guelph Senate. Accordingly, at their March, 1977 meeting the Senate Library Committee discussed the implications for University policies of the Library's new circulation control system. The Library Committee approved the policies and definitions which follow and which were presented to Senate for information. It was emphasized that experience and statistical information gained from the system would be taken into account once the system was in operation, with a view towards possible revision.

(a) Loan periods.

The basic loan periods were to remain the same; however, the new system would allow for a more equitable distribution of available resources. In the past, the Library Committee had suggested limits to some classes of loans, such as Reserve and semester loans.

Under the following limitations, a patron may have on loan any number of volumes up to the maximum permitted, at any one time. A patron cannot borrow more than one copy of the same edition of a title.

Courtesy borrowers (including off-semester students):

—2 week loan *only* (no 3-day or Reserve, no "holds");

—maximum of 10 items on loan at any one time.

Courtesy borrowers in the 1000 000 001 - 999 sequence (Fellows/OMAF/CDA/Retired Faculty/Visiting Non-Teaching Professor):

—all loans except Reserve to the maxima set below;

—semester loans: maximum of 15 *volumes;*

—2-week loans: maximum of 15 *volumes;*

—1 and 3-day loans: maximum of 10 *volumes.*

Faculty, Graduate Students, Post-Doctoral Fellows, Professional Staff:

—all loan periods to the maxima set below;

—semester loans: maximum of 15 *volumes;*

—2-week loans: maximum of 15 *volumes;*

—1 and 3-day loans: maximum of 10 *volumes;*

—Reserve loans: maximum of 1 *volume.*

Undergraduate and Unclassified students:

—no semester loans (special privilege available);

—all other loan periods to the maxima set below;

—2-week loans: maximum of 15 *volumes;*

—1 and 3-day loans: maximum of 10 *volumes;*

—Reserve loans: maximum of 1 *volume.*

Support staff:

—no semester loans (special privilege available);

—all other loan periods to the maxima set below;

—2-week loans: maximum of 15 *volumes;*

—1 and 3-day loans: Maximum of 10 *volumes;*

—Reserve loans: maximum of 1 *volume.*

The loan period on an item may vary depending on the number of requests to hold that have been placed for it and the number of copies actually available for circulation. The system is programmed to allow for a flexible response to demand, one that does not require continuous manual changes to the individual copies involved.

A new 1-day loan period has been introduced to meet the need for overnight loans on sudden high-use items, this loan period to be available only when user requests warrant it.

The present system of placing material on limited loan (3-day, or 2 hour Reserve) continues, where faculty can anticipate high demand and allow the Library to plan ahead

(b) Charging out a book or document.

A valid University Card is required. (See '5' below) Normally, a patron will be allowed to borrow only *once* during a semester without his/her card, and only upon presentation of suitable alternate identification.

Occasionally, as described below, a message preventing the patron from borrowing (a "stop transaction"), will appear on the circulation control terminal. At this time the Library staff member may override the stop transaction, allowing up to three items to be borrowed. The patron must clear the message with appropriate Library staff during regular week-day hours of service before further borrowing is possible.

The system allows the Library to screen an item being charged out to see if someone has placed a request for it. If a conflict arises, the patron at the circulation desk will be allowed to borrow the item if the request to "hold" (by another patron) was placed only that same day.

The rationale for this policy is based on one patron's possession of the item in question at the time the request was placed by another patron. If the request was placed on an earlier day, however, the likelihood is that the item has been held, (e.g. in a research carrel or in another sequence in the stacks) without checking it out. This forfeits the claim of the possessor over the patron placing the request. If someone wishes to use an item for more than one operational Library day, it behooves him/her to charge out the item, lest he/she deprive another patron of it or of knowledge of its whereabouts. The proper operation of this policy also requires the Library Divisions to check the stacks for unsatisfied requests (on items that have not been charged out through the system) normally once a day.

(c) Renewals.

The existing policies with regard to non-renewal of 3-day and Reserve material are extended to the new 1-day loan period. In all cases, such high demand items must be given the chance to return to the shelves even when not requested by another patron.

An item cannot be renewed by one patron for another patron, and must be presented at the correct circulation desk.

It may be immediately charged out to another patron if there is no hold request for it, and if it has not been renewed.

In an open-access library the value of browsing through a section of the collection is very important to users. The system allows a limitation on the total number of renewals, so that items will return to the shelves after reasonably long use by one borrower.

(d) Overdues and fines.

The object of a system of overdue notifications and fines is to promote the circulation of library materials to the greatest number of users through courtesy reminders as well as penalties for abuse. The system continues to generate overdue notices as a courtesy to patrons. It also posts an "inform" message on a patron's record, as a courtesy, to remind the patron of an overdue the next time he/she borrows a book, document, or Reserve item.

The problems faced by a patron who has had a semester loan recalled through the campus mail will be considerably diminished if he/she is a regular borrower. The system posts an "inform" message to the patron's card as soon as the recall notice is generated, as an extra courtesy reminder about the recalled item.

Table II illustrates the time frame for the various stages in the overdue and fine procedures.

(e) Request to hold policy.

Courtesy borrowers, including off-semester students but excluding those in the 1 000 000 001-999 sequence (Fellows/OMAF/CDA/Retired Faculty/Visiting Non-teaching Professor) may *not* place holds. Courtesy borrowers should not restrict the use of materials required by registered students, faculty and professionals engaged in study, teaching and research.

TABLE II

Type of Loan	"Inform" message posted	1st overdue notice generated	2nd overdue notice generated	"stop" transaction posted	Item declared "Lost" and listed
Reserve item	1-59 min. overdue	due date +1	(none)	60 min. overdue	due date +2
3 day or 1 day loan	(none)	due date +1	due date +4	due date +1	due date +14
Recalled Semester Loan	date recall generated	"new" due date +1	"new" due date +4	"new" due date +1	"new" due date +14
Semester Loan	due date +1	due date +1	due date +4	due date +4	due date +14
2-week Loan	due date +1	due date +4	due date +10	due date +10	due date +20

Semester loans are viewed as fulfilling a special need for items not otherwise in demand by others in the university community. A patron request for an item when there are one or more copies out on semester loan will cause the semester loan with the earlier date borrowed to be recalled.

In order to allow the function of patron requests to operate efficiently and within reasonable limits and constraints of the circulation system as a whole, there is a limit of 15 active requests to be made by any one patron at any one time. Furthermore, a patron may not have more than *one* request for an item at any one time; may not place a request to hold an item that he/she already has charged out; and may not place requests for Reserve 2 hour course material.

If a patron fails to pick up a request within *three* days, (including the day of "capture"), the request moves to the next requester or is returned to the shelves. Should there be some reason, such as illness, for not collecting the request, it will be possible for the appropriate library staff to place the former requester in a priority position in the queue.

Patrons with longer range needs, such as graduate students, may continue to maintain their requests in an active mode for up to 12 months from the date the request was placed. This will allow their requests to be filled by replacement or added copies in those instances where the original copies were unavailable for loan.

3. Information messages.

There are three distinct types of messages delivered by the system.

(a) Descriptive.

e.g.—name of the system;
name of the program;
etc.

(b) Operational.

e.g.—date;
time;
terminal number;
invalid option;
no authorization;
invalid password;
wand your badge;
etc.

These two messages, descriptive and operational, are generally of use primarily to the staff and have little impact on the patron. The third type of message is referred to as an "Inform" message, and transmits relevant information to the patron.

(c) "Inform."

e.g.—holds are available;
book has been recalled;
unpaid fines outstanding;
etc.

These messages require no action on the part of either the patron or the operator.

There is also a mixed class of messages which include information which is "operational" for the staff member, requiring some additional activity. At the same time the message instructs the patron as to the state of his/her record.

e.g.—no borrower record on file;
borrower not authorized this type of loan;
maximum loans already taken out;
borrower has too many books overdue;
book required for hold;
etc.

A complete list of "Inform" messages follows, including both the third and mixed class described above.

These are listed in two ways. The first is alphabetically by function as they appear on the terminal display. The second is an alphabetical listing, with the function number under which the message would appear indicated as well.

Function: Charge/Renewal.

Book has been recalled.
Book is loaned to another borrower.
Book is reserve loan only.
Book renewed maximum number of times.
Book required for hold.
Borrower has max. no. of loans of this type.
Borrower has Reserve book overdue.
Borrower has too many books overdue.
Borrower inactive.
Borrower is not authorized for this loan period.
Borrower not authorized this type of loan.
Holds are available.
Loan period altered to two weeks.
Maximum loans already taken out.
Maximum override capability used.
No borrower record on file.
No renewal, send to Reserve.
One day maximum loan.
Only three books out under override.
Overdue fines, see Information Desk.
Reserve books cannot be renewed.
See Circ. Info. Desk.
This book was recalled.
Three day maximum loan.
Too many books overdue.
Two hour maximum loan.
Two week loan.
Two week loan in effect.
Unpaid fines outstanding.

Function: Borrower Inquiry.

A book has been recalled.
Book recalled.
Book renewed once.
Book renewed thrice.
Book renewed twice.
Book renewed 4 times.
Borrower record inactive.
Borrower record not found.
Fines >$4.99 unpaid.
Fines <$5.00 unpaid.
Lost book charge.
No charge transactions recorded.
No fines are recorded.
No holds are recorded.
Overdue fine.
Processing charge.
This is not a University of Guelph badge.
Total fine owing.
You must wand your badge to use this function.
Your badge was not read correctly, retry.

Function: Item Inquiry.

A copy is in the library. Do you want the hold?
A hold has been placed for you.
All copies are on Reserve.
All copies are unavailable.
Book already on hold for you.
Book charged out to you.
Charged out.
Hold not placed.
Holds are available for you.
Holds are over limit.
In library.
In Reserve.
Inactive Borrower record.
Invalid date, retry.
Lost item.
No borrower record found.
No holds are allowed.
Not a U. of G. badge.
Please see Circ. Info. Desk.
Wand misread, retry.
Withdrawn.
You must wand your badge.

Function: Borrower Maint(enance).

Active.
Amount cancelled:
Amount paid.
Book has been recalled.
Book recalled.
Cancelled.
Fine cancelled.
Fine paid.
Fines >$4.99.
Fines <$5.00.
Holds are available.
Holds avail.
Inactive.
Lapsed.
Lost charge.
Orig. Assmnt.
Picked up.
Proc. charge.
Reduced by:
Renewed 1.
Renewed 2.
Renewed 3.
Renewed 4.

Function: Hold Maint(enance).

Book held for patron.
Book out to patron.
Borrower inactive.
Fines >$5.00.
Fines <$5.00.
Hold placed.
Holds at maximum.
Hold(s) available.
Inactive Borrower.

Last hold cancelled.
Max. loans over limits.
No Borrower found.
No record found.
No (more) holds.
Not a U. of G. badge.
Not a U. of G. book.

'Inform' message, alphabetical listing. Numbers in brackets refer to the functions where expressions are used.

A book has been recalled (3)
A copy is in the Library. Do you want the hold? (4)
A hold has been placed for you. (4)
Active. (6)
All copies are on reserve. (4)
All copies are unavailable. (4)
Amount cancelled: (6)
Amount paid: (6)
Book already on hold for you. (4)
Book charged out to you. (4)
Book has been recalled. (1,6)
Book held for patron. (8)
Book is loaned to another borrower. (1)
Book is reserve loan only. (1)
Book out to patron. (8)
Book recalled. (3,6)
Book renewed maximum number of times. (1)
Book renewed once. (3)
Book renewed thrice. (3)
Book renewed twice. (3)
Book renewed 4 times. (3)
Book required for hold. (1)
Borrower has max. no. of loans of this type. (1)
Borrower has reserve book overdue. (1)
Borrower has too many books overdue. (1)
Borrower inactive. (1,8)
Borrower is not authorized for this loan period. (1)
Borrower not authorized this type of loan. (1)
Borrower record inactive. (3)
Borrower record not found. (3)
Cancelled. (6)
Charged out. (4)
Fine cancelled. (6)
Fine paid. (6)
Fines >$4.99. (6)
Fines >$4.99 unpaid. (3)
Fines >$5.00. (8)
Fines <$5.00. (6,8)
Fines <$5.00 unpaid. (3)
Hold not placed. (4)
Hold placed. (8)
Holds are available. (1,6)
Holds are available for you. (4)
Holds are over limit. (4)
Holds at maximum. (8)
Holds avail. (6)
Hold(s) available. (8)
In library. (4)
In reserve. (4)
Inactive. (6)
Inactive borrower. (8)
Inactive borrower record. (4)
Invalid date, retry. (4)
Lapsed. (6)
Last hold cancelled. (8)
Loan period altered to two weeks. (1)
Lost book charge. (3)
Lost charge. (6)
Lost item. (4)
Maximum loans already taken out. (1)
Maximum override capability used. (1)
Max. loans over limits. (8)
No borrower found. (8)
No borrower record found. (4)
No borrower record on file. (1)
No charge transactions recorded. (3)
No fines are recorded. (3)
No holds are allowed. (4)
No holds are recorded. (3)
No record found. (8)
No renewal, send to reserve. (1)
No (more) holds. (8)
Not a U. of G. badge. (4,8)
Not a U. of G. book. (8)
One day maximum loan. (1)
Only three books out under override. (1)
Orig. assmnt. (6)
Overdue fine. (3)
Overdue fines, see Information Desk. (1)
Picked up. (6)
Please see Circ. Info. Desk (4)
Processing charge. (3)
Proc. charge. (8)
Reduced by: (8)
Renewed 1. (8)
Renewed 2. (8)
Renewed 3. (8)
Renewed 4. (8)
Reserve books cannot be renewed. (1
See Circ. Info. Desk. (1)
This book was recalled. (1)
This is not a University of Guelph badge. (3)
Three day maximum loan. (1)
Too many books overdue. (1)
Total fine owing: (3)
Two hour maximum loan. (1)
Two week loan. (1)
Two week loan in effect. (1)
Unpaid fines outstanding. (1)
Wand misread, retry. (4)
Withdrawn. (4)
You must wand your badge. (4)
You must wand your badge to use this function. (3)
Your badge was not read correctly, retry. (3)

4. Informing and educating the user community.

Both the University Senate and Administration were anxious that the Guelph academic community be informed about the changes in the Library circulation system, procedures and policies in advance of implementation. The following program was initiated prior to the Summer semester, 1977, and continued, as appropriate in subsequent semesters.

(a) A letter was sent to all members of the user community;

(b) An information sheet describing circulation procedure and policies in detail was prepared for distribution within the Library at all Library service desks or during orientation programs;

(c) A bookmark containing brief information was distributed from all Library service desks;

(d) Information about the system was sent to the various campus publications (including Alumni.);

(e) The student orientation program was changed to include a section on the new circulation system. In addition, special seminars were offered to faculty, staff, or students who wished more detailed information or a demonstration.

5. Patron badges.

The implementation of the new Library circulation system coincided with the introduction of mandatory, permanent university identification cards containing photographs. These new cards were designed in co-operation with the Library, Registrar's Office and the Office of the Vice-President, Academic, and incorporated the Library bar-code label.

Student cards are validated at each registration; faculty and staff cards are validated annually.

Library cards for special privilege borrowers (not members of the university community) are produced by the Library at the completion of special privilege request formalities.

Bar-code labels for new students registering each semester are produced in the Library bar-code label printer from tapes supplied by the Registrar or Office of Graduate Studies. The Personnel Department sends the Library information necessary for producing bar-code labels for new faculty or staff members, and this data, like that for special borrowers, is converted to machine readable form by Library staff.

A by-product of the label production system is a constantly updated borrowers' file. Inactive names are deleted upon instructions from the offices mentioned above, and are placed on the History file. They remain in the system, however, so that an ineligible patron can be "stopped" from borrowing library material.

6. Interim period, December 1977-July, 1977.

Since it would be early summer 1977 before the on-line system would be ready it was felt to be imperative that an interim replacement be secured for the existing Mohawk data collection terminals. The Epic data collection terminal was chosen since it could read the punched cards already in use and had the capability of having light wands for reading bar-code labels added at a later date. This capability also made the Epic terminal a candidate for selection as the final terminal for use with the on-line system.

A small polling program was written for the GEAC 800 computer and in December, 1977, the Epics replaced the Mohawk terminals. As development on the on-line system progressed it became obvious that more display capability was needed than the Epic, even when equipped with the plasma display, could offer, so the Informer 303 was chosen as the terminal for the final implementation.

7. Parallel operation, July-August, 1977.

During July and August, 1977, three one-week parallel tests were run to ensure accurate operation of the on-line system. After each test corrections were made and safe-guards were added to the on-line programs. Finally, on Monday, September 5, 1977, the on-line system was declared operational and the batch system was relegated to a clean-up role. Any books that had been checked out on the batch system were discharged on it, while all new charge-outs were done on the on-line system. Finally, in late November, 1977, the remaining records from the batch system were transferred to the on-line system, and the batch system was finally retired, after nine and a half years of operation.

8. First semester operation and final implementation, January, 1978.

Due to a development problem with the memory segment, the delivery of the GEAC 8000 was delayed until January 1978, and as a result the Fall semester system was run on a GEAC 800 hybrid. Unfortunately, this unit did not have "power fail protect" on it, and this caused some difficulty during the fall thunderstorms. Large powers surges on the power line during the storms caused the system to fail.

There were also system failures caused by software errors. These were corrected as soon as they were discovered, and by mid-November, 1977, the software was error free.

As the Library staff gained experience with the system many suggestions were made to improve the operation. These suggestions were incorporated into Version '2' of the system, which was installed, with the GEAC 8000, the first week of January, 1978.

The hardware has proved 100 per cent reliable since that time, operating from January through July, 1978, with zero down time. Version '2' of the programs proved almost as reliable, as only three errors were encountered in the month of January. After these were corrected the entire system ran error free from that time to the present, a performance record which is almost impossible to better.

The enthusiastic response of both faculty and students should also be reported. The self instructing terminal displays have proved quite effective for the unsophisticated or inexperienced user, easing the transition from the traditional card catalogue to on-line enquiry. The many additional services as well as the efficiencies which the system so obviously supplied convinced the entire University community that the Library decision had been the correct one.

APPENDIX I

Equipment.

Mini-computer.

As described in the text, the unit in use is a GEAC 8000, designed and built in Canada by a Canadian owned company. The configuration of this unit, in addition to its 256K C.P.U. and its intelligent communications controller, includes two 300 megabyte disc drives, a 125 line per second magnetic tape drive, a 300 line per minute printer, a CRT control console, and 32 communications ports. (see figures 78 and 79)

Terminals.

Of the 26 Informer 303 poll block terminals presently active, six are available for public use, another ten are manned to give public service (charge, discharge, fine payment, etc.), and the remaining ten are dedicated to technical services kinds of operations, i.e. updating of files, etc.

The Informer consists of a typewriter keyboard, a light pen (or wand), and an intelligent CRT display. The keyboard is augmented by an additional block of numeric keys to the right hand side, and operational keys to the left. (figures 80, 81, 82, 83, 84, 85)

Bar code label printer.

For the production of its bar code labels (book, patron, and operational) the Library used a Pitney Bowes, Monarch Marking Systems 2052. This equipment uses labels in rolls. (figures 86 and 87)

Materials.

Bar code labels.

The equipment described above produces labels with or without identifying information printed above the bar code, and with an alphanumeric translation beneath the code.

These labels can then be used in a number of ways. They can open the item file and identify a particular "book" (see figures 88 and 89). They can open the borrower file, giving the borrower access to his own record. (see figure 90) They can also be used to direct the computer from one function to another without the need of a keyboard entry. (figure 91)

Fig. 78

Fig. 79

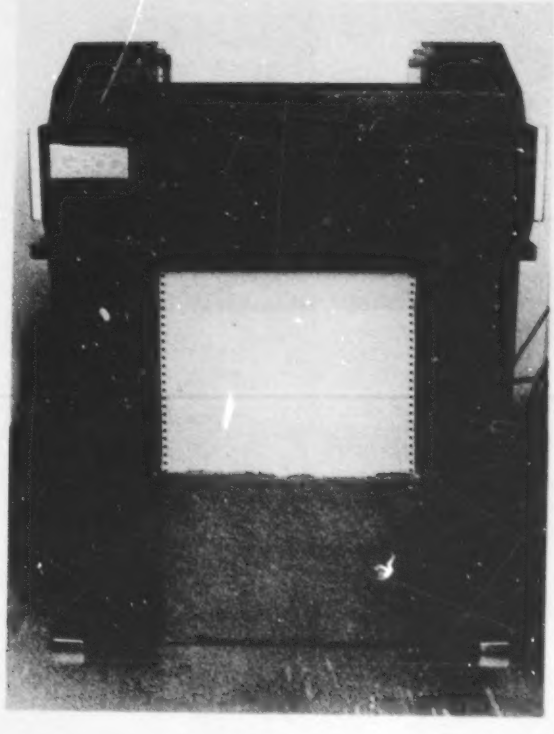


Fig. 80

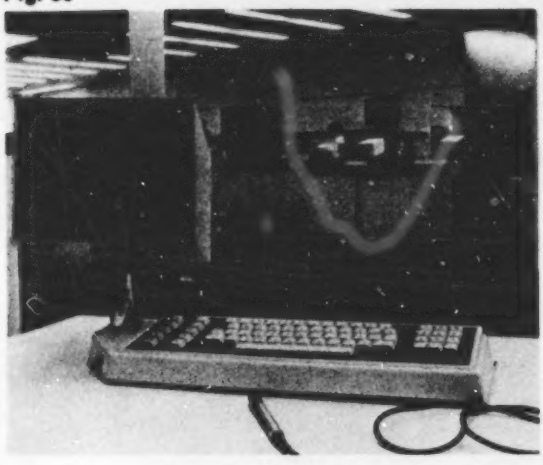


Fig. 81

Fig. 82

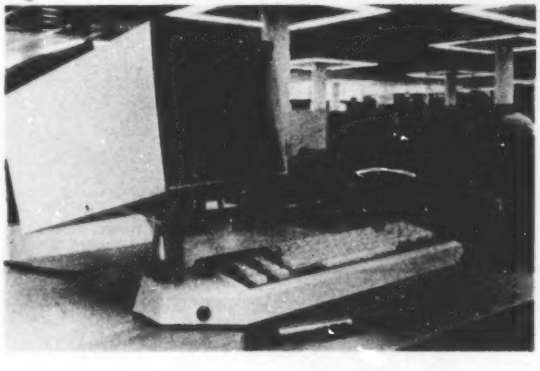


Fig. 83

Fig. 84

Fig. 85

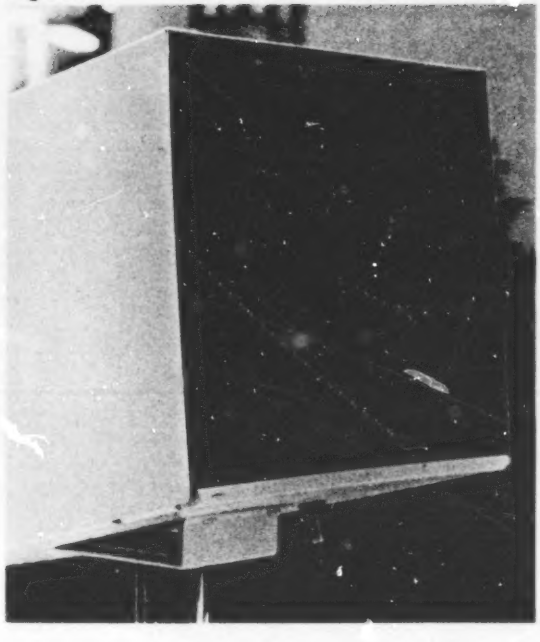


Fig. 86

Fig. 87

Fig. 88

QH 352.A66 V1

a31188005799149b

Fig. 89

QH 352.A66 V1

a31188005799149b

UNIVERSITY OF GUELPH

The Library

QH 352 A66
V.1
APPLIED BIOLOGY / EDITED BY
T.H. COAKER. --

Fig. 90

9000111000 NOT VAL

a21188000049989b

KEEP THIS CARD IN YOUR POSSESSION AT ALL TIMES
REPORT LOSS OR FINDING TO THE LIBRARY IMMEDIATELY

1. This card is the property of the University of Guelph.
2. Students who withdraw, and faculty or staff who leave the employ of the university must return this card to the Library immediately.
3. The person whose name appears hereon is responsible for all use made of this card unless and until written notice is received by the Library of its loss or theft, or until it has been returned.
4. This card is NOT transferable and must be used only by the person to whom it has been issued.

THE HOLDER MUST BEAR THE COST OF REPLACEMENT 785

BEST COPY AVAILABLE

Fig. 91

RESERVE LOAN

ONE DAY LOAN

THREE DAY LOAN

TWO WEEK LOAN

SEMESTER LOAN

CHARGE BOOK

DISCHARGE/RESHELVE BOOK

RENEW/CHARGE BOOK

OVERRIDE

ACKNOWLEDGE